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# Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY

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## ON TOP OF THE WORLD

**Lineman W. K. Mullen of California Interstate Telephone Co. rides strand over proposed rerouting of a federal highway near Victorville, Cal. Note preliminary work on roadbed in center of photo and the old cable lead.**

MANAGEMENT • PLANT • TRAFFIC • COMMERCIAL • LEGAL • ACCOUNTING

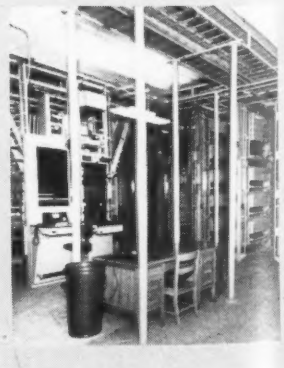
# Who else wants to save money?

CENTRAL OFFICE TROUBLE REPORT—1954

| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| XY Switches | 3 | 0 | 4 | 4 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 2 |
| Linefinder Toll | 9 | 0 | 1 | 0 | 0 | 1 | 4 | 0 | 1 | 1 | 1 | 0 |
| Toll Selector | 0 | 0 | 0 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Selector | 5 | 1 | 1 | 3 | 1 | 3 | 4 | 0 | 2 | 1 | 5 | 0 |
| Connector | 0 | 3 | 3 | 2 | 2 | 1 | 1 | 0 | 2 | 0 | 0 | 0 |
| Misc. | 8 | 16 | 14 | 8 | 10 | 13 | 6 | 21 | 12 | 11 | 7 | 3 |
| Totals | 25 | 20 | 23 | 18 | 17 | 18 | 15 | 22 | 17 | 13 | 15 | 5 |

Total 208

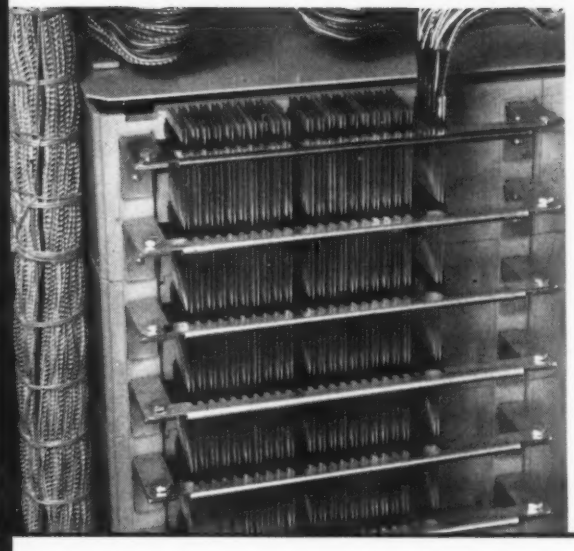
## These actual figures show how an XY® Dial System drastically reduces maintenance costs.

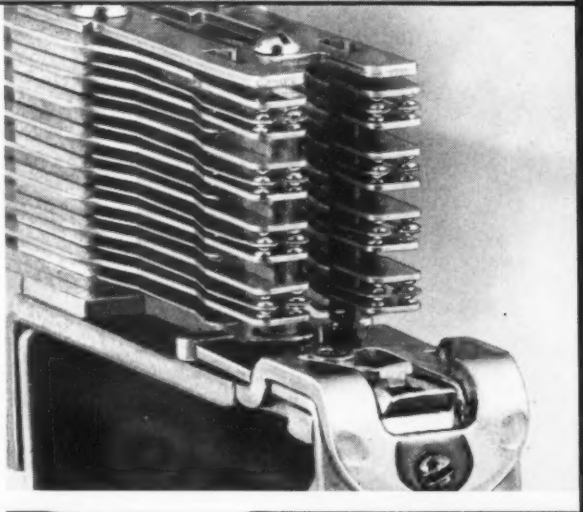


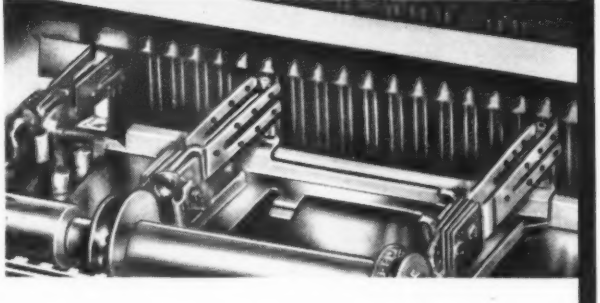
**TROUBLE REPORTS FOR THE ENTIRE YEAR 1954** show that this 2500-line XY Dial System averaged only 4 inside trouble calls a week! Note that the switches themselves operated almost entirely without attention for six months (May through October).

This exchange, serving 5000 terminals, is at the Junction City Telephone Company, Junction City, Kansas, and was cut into service on September 5, 1953.

# 3 vital reasons why an XY System cuts your maintenance costs







**1. VERTICAL WIRE BANKS** employ a principle your wife is very familiar with: dust and dirt will not collect easily on a vertical surface. Thus, you get more positive switching contact, with a minimum of interference. No feather dusters or scrub brushes needed to remove dust and dirt.

**2. TWIN CONTACTS** are standard Stromberg-Carlson practice on all switches and relays. This more than doubles efficiency. On relays alone, it reduces the probability of failure approximately 23 times that of single contacts.

**3. SWITCH WIPER AND WIRE BANKS** will *never* need replacing. They are engineered to outlast the system itself.

SAVING DOLLARS on maintenance is just part of the XY story. To learn how an XY Dial System can also increase your total revenue—perhaps double the efficiency of your operation—call your Stromberg-Carlson representative.

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# FLASHES AND PLUGS

**RELEVANT DETAIL.** Michigan Bell Magazine, looking backward, on its 50th anniversary, to the first gag it published, retells the story about the maid whose best young man called one evening, fully determined, as it was learned later, to propose.

His courage failed him, and after the usual evening gossip, he went away with the important question still unasked.

No sooner had he reached the street than there came over him the fear that if he waited another week it would be fatal to his chances. The idea came to him to use the telephone. He called up the apartment and his Maria answered.

"Yeh-as, I'm Maria."

There was a long talk from the other end of the wire while Maria held the receiver close to her ear and smiled happily. Presently she said:

"Why certainly, I'll marry ye, honey. Er-er-wats the name of the gen'lman speakin'?"

•

**THE RISING TIDE.** Although caught by rising postwar prices, Australians have been able to cling to one solid rock.

For 37 years it has been possible to telephone from a public paystation for a mere 2 pennies. The natural result is that 130 million such calls are made yearly on the country's 19,000 public telephones.

Now, needing revenue, the Australian government has raised the rate to 3 pennies beginning in October.

•

**IN THE LINE OF DUTY.** In Switzerland, the Zurich Telephone Co. offers a new service which should make friends and pour oil on troubled waters. For a small fee the company provides a "reminder service for those hard-working business men who forget such important events as birthdays and wedding anniversaries."

•

**"L" FOR LUCK.** Any way you take it, that gentleman in Lynchburg, Va., had hard luck.

His parked car was struck by another.

The offending motorist left a note with a number for Cox to call alright, but rain made the number too indistinct to figure out.

•

**THE WINNER!** A man who may be champion for a long time took over early in October as holder of the last place in London's telephone directory. His name: V. K. Zzzu.

In the new directory Mr. Zzzu gained his prideful place from Lewiz Zzymbla, who reigned for years.

**CIRCULATION**

**Guaranteed circulation of this issue is 10,601 of which 10,068 is paid.**


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*Since 1901*

**October 15, 1955**


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# Major Challenge of *Modern Telephone Management*

By GEORGE E. BREWER*

ON Nov. 18, 1954, at the Statler Hotel in Washington, the late Warren B. Clay, then president of the United States Independent Telephone Association, addressed a distinguished audience of 400 people gathered together at a banquet celebrating the installation of the 50-millionth telephone in the United States.

You all remember Warren as a truly fine telephone man and as a great president of our national association.

Warren's audience that night was composed of the leaders of our industry nationwide, and of leaders of our country drawn from the Washington political scene.

It was truly a distinguished audience.

Warren's speech that night, and his delivery of that speech projecting as it did his deep sincerity to each of his listeners, made all of us proud of him and proud of ourselves as telephone men and women.

Among the things that President Clay said that night were three sentences which are germane to my talk . . . because they are so nicely introductory to a talk on the development of people in the telephone industry.

Warren said, and I am indebted to Clyde Bailey for reminding me of what he said, the following, and I quote:

"As I view it the greatness of the telephone industry does not spring alone from the mortar and bricks in its structures, the metal in its equipment, or the architecture of its buildings, important as all these things may be.

"The greatness springs more from the spirit of service of the people who man the lines—the management, the department heads, the supervisors, the operators, the installers, the linemen, the cable splicers, and all of the other loyal men and women employed in an essential calling.

"The enthusiasm these people put into their jobs comes from a characteristic common to all—a desire to do their part in providing a constantly improved communication service."

*In my opinion the major challenge of modern telephone management, particularly in the Independent branch of our industry, is the challenge to develop people.*

To develop the kind of people, both men and women, who are so obviously

G. E. BREWER

essential to meeting the future needs of the business.

President Clay spoke of us that night in Washington as a great business, *made great by the efforts of people.* We cannot ever afford to forget that such is the case, *that people are essential to our greatness!*

We must develop people to meet our future needs, all sorts of people for all sorts of jobs. *And they must be better telephone people than are you and I.* Better in terms of basic education, in terms of work background and experience, and most essential, in terms of over-all knowledge of the telephone business and of the place of that business in the American industrial and social scheme of things.

### *Development of Executives*

The development of people in industry is a very broad subject. Because of time limitation and because of its primary importance, I will confine my remarks to one area of the subject, that area concerned with the development of those people who will be your executives of tomorrow.

The National Industrial Conference Board, in its "Studies In Personnel Policy No. 107," has this to say about the subject of the development of executives and I quote:

"Trees begin to die first at the top. Napoleon is reputed to have observed: 'There are no bad regiments, only bad colonels.' If such statements as these can be applied to business, the importance of executive development becomes clear.

"A baseball team can afford an extra man or two on the bench for each man in the field. Most companies feel they cannot back up their top people so deeply. But the question can be asked: 'Can a company afford *not* to build an adequate reserve of trained executives to safeguard its future?'

"An increasing number of companies are answering this question in the negative. *They argue that the future of a company depends upon the quality of its management personnel more than upon any other single factor.* They add that the demands on the management group are becoming heavier year after year because of governmental regulations, technological developments and important social and political changes.

"But where will business leaders of

*Mr. Brewer, vice president of Telephone Services, Inc., gave this address at the recent convention of the New York State Telephone Association.

the future come from? And how can they best be developed?

"These matters troubled earlier generations very little. In the past it was said: 'When the president dies, we hire a new office boy. Everyone moves up. Honesty, sobriety and hard work are the qualities an ambitious employe needs to get ahead. Experience is the best teacher. Going to night school helps. The cream will rise to the top.'

"Twenty-five years ago probably no company had a program of executive employment, as such a program is thought of today. The Horatio Alger or office-boy-to-president formula was generally accepted. And certainly this country produced a host of successful business leaders. Strong men, self-made in many respects, rose to the top in organizations both large and small and they served their businesses and their communities well.

"Now thoughtful business men are asking if the old system can be followed much longer with safety. Of course, character and ambition are still important in business and they always will be. So are the efforts of the individual, both on and off the job, to improve himself. The question is: Are these things enough? Or have changes occurred in business and society that call for a re-examination of our basic assumptions?"

### *Liberal Arts Broadening*

TELEPHONY, in one of that magazine's recent issues, reproduced an editorial from the Chicago *Sun-Times* in which that newspaper comments favorably upon one facet of the executive training program of the Bell Telephone Co. of Pennsylvania. The Chicago *Sun-Times* said:

"Today's executives must be broad-gauged, well-read men interested in everything from the Bible to bookkeeping. Yet it is ironical that this age of specialization seems to be developing some bosses who often are disinterested in ideas and events not directly related to their jobs. . . .

"But President Wilfred D. Gillen of the Pennsylvania Bell Telephone Co. should be applauded by every American taking a wiser view. He realized that the young executive, despite his technological know-how, needed training that would prepare him to make the broad decisions required by modern business. So he has sent 36 of his bosses-of-the-future to the University of Pennsylvania for a full-time, 10-month course in the liberal arts.

"The plan has been termed a 'success' by both the company and the university. Course 'graduates' agree they are prepared to make 'better decisions.'

"Our universities certainly provide a climate in which Chicago area firms, which want to, could use the Pennsylvania plan.

"Intelligent leadership is a cornerstone of business as well as government. Everyone—the bosses, the nation and the underlings—would benefit by schooling executives in logic, esthetics, philosophy and ethics."

### *Recognizing the Problem*

Sometimes one of the most difficult things to do as a business leader, operating in the vigorous, growing full-of-pressure atmosphere that pervades a business such as ours, is to recognize a problem. Once recognized, most problems in business are fairly easy to come to grips with and to at least make some attempt to solve, if not to solve completely.

*All too frequently the problem of executive development is not recognized until it is too late to do anything really constructive about it.*

I have quoted to you several passages from trade publications and the press indicating that the problem of executive development and the challenge inherent in its solution is clearly recognized by some big business and by management organizations looking over-all at the nation's business community.

Today, however, it seems to me that we are concerned with how to recognize the need for a program of executive development at the level of an individual company; to answer the question: "Do I, in my business, need such a program?"

Perhaps it would be well for me at this point to give you a definition of what I am talking about when I speak of a program of executive development in a company.

I mean simply "those things which the management of a company does to create an over-all atmosphere throughout the employe group which fosters and encourages the growth of people desirous of assuming responsibility for the future guidance of the business." It's just as simple as that.

*What I am talking about is a way of life in management. A constructive and meaningful way of life for the business.*

Do you in your business need such a program? There is only one answer, be you big business or small business. That answer is a resounding YES!

### *Dealing with the Problem*

Having recognized the problem and accepted the need for management development, next we need to decide what is necessary to be done in order to meet the problem. What are those things which management needs to do?

*The first thing management needs to do, it seems to me, is to accept responsibility for the perpetuation of itself.*

No man or woman, regardless of how great their mental and physical strength, can live forever. And if they do live a long time, they simply cannot carry throughout the period of a long life the same work load which was their joy to carry at their physical and mental peaks.

Wise men and women seek early to perpetuate themselves through younger people, through an early sharing of their work load and their know-how with younger people. A man's greatest accomplishments are frequently not those things which he has himself accomplished but are those things accomplished by those who work with him and carry on after him.

All of us recognize the truth of such a conclusion. It is the same truth upon which our whole Christian civilization is based.

### *Selecting a Program*

All worthwhile efforts deserve a program. Management, therefore, in its efforts to perpetuate itself in the true philosophical sense, needs a program.

Should our program be formal, informal, written, conveyed only by the spoken word, fixed and unchangeable or subject to constant change? The answer to this question depends upon many variables.

The size of your business, the number of management jobs, the complexity of the work to be done are but a few of the more important of such variables.

Since the answer is dependent upon these variables, you must therefore answer the question for yourself and establish your program accordingly.

*The important thing is to have a program,* expressed to your organization in some understandable way, *and to be working under such a program.*

In the Continental Telephone System we have a management development program. It is partly formal, partly written, talked about frequently and worked at all the time in each one of our companies. It has gone a long way toward providing us with the telephone executives we need now and will need later. It is being increased in its scope constantly.

All of our top executives are steadily at work planning for and working at the job of setting up an atmosphere in which those people who desire to grow and expand can grow and expand.

Choosing those people who will be made a part of your program after the establishment of the program does not need to be the great problem it is sometimes labeled as being.

### *Begins at Supervision*

A great deal depends on the scope of the development program you have established.

In the Continental Telephone System, executive development as a matter of programming, begins with the first line of supervision. Therefore, with us, when a man is first chosen for a position as a supervisor he is also chosen to be part of our program of executive development.

Recently some 62 presidents of companies were asked and responded to the following questions, "Do you believe a sufficient number of natural leaders will arise and be ready to take over as executive vacancies occur in a company, or is some definite plan needed to identify and develop these men in advance of the need?"

The National Industrial Conference Board was the questioner.

Four out of five of the presidents replied that they felt that some definite plan is needed; nine said that they felt enough natural leaders would arise and three straddled the question.

Few of them would say, however, that their companies had done the proper sort of systematic planning for selection and *none of them claimed a formula for selection now operating to their complete satisfaction.*

The field, you see, is wide open. The important thing is the program. Selection is largely a matter that falls naturally in line with your honest desire to make the program work most effectively for your company.

If you are willing to make the best effort possible to perpetuate management through others, you will necessarily also make the best effort possible to find top material for your program.

### *Specifics of a Program*

At this point I am hopeful that your curiosity has been aroused to the point that you want an answer to the question, "Exactly what do you mean by a program for executive development," I hope you are saying to yourselves, "Stop beating around the bush, Mr. Brewer. Let's be specific!"

All right, I'll try to answer the question, and insofar as I can do so, get specific.

In the Continental Telephone System our program for executive development is conceived and motivated from the very top of the organization.

At the top we are interested in developing people who will be tomorrow's top people; in other words, people who will replace us. These people during their period of development generally serve as executives of the several affiliated operating companies.

Incidentally, all of our principal operating heads, top-side, as of the present time, came from the field companies.

Our program for those affiliated operating company executives is simple in concepeion but broad and varied in its application.

*It begins with a broad delegation of authority to run the affiliated operating company subject only to policy direction from the top of the organization.*

It includes exposure to the problems of the entire organization through system-wide conferences in which constant opportunity develops for the participants not only to be informed of problems but to assist in their solution.

### *Activities, Education*

These executives are encouraged to participate strongly in community affairs, to identify themselves as good citizens. They become associated with national organizations devoted to management, such as the Research Institute of America, and the American Management Association among others.

They participate as students in university courses devoted to betterment of utility management and as planners with university staffs in the development of courses to train utility managers.

Several of our people have attended the summer course for utility executives given by the University of Michigan. Others have attended or plan to attend the American Management Association executive training course.

These courses are refresher courses. They provide a man with the time and the atmosphere in which he can refresh and re-evaluate the knowledge which he already possesses, to line up his know-how anew. Men return from these courses with renewed foresight and vigor.

In the state of Texas recently our local company management joined forces with the faculty of one of the state universities in planning and promulgating a course for telephone executives at the lower and middle management levels.

Likewise, in the state of Illinois, local company management worked with the state department of education in developing and carrying out a training program in basic supervisory practices.

Not only are we interested at the top of our organization in these operating executives being trained but we are also interested in the training which they carry on themselves in each one of their companies.

There is an old saw in education that goes something like this: "If you would have a man know a subject thoroughly, arrange for him to teach that subject to someone else." We take full advantage of the wisdom inherent in this old saw.

### *Staff Meetings*

Regular staff meetings with principal subordinates, weekly, monthly or quarterly, supplemented by special meetings are the order of the day in system operating companies. These meetings are pretty much devoted to telling the story of where are we going, where are we now and where do we go from here. Very little information, if any, including financial information is held back from the participants.

In such meetings the operating head of the company learns his own subject most thoroughly through the process of teaching others. These meetings, too, are one of the principal means by which he establishes himself as the respected and trusted leader.

In larger companies, generally at less regular and frequent intervals and with much less time consumed in the meetings, the district managers will also conduct staff meetings similar in general pattern.

In several of our field companies all of the first line supervision has been enrolled into membership with the Research Institute of America. Completely free of any company dictation, this management organization works with our people by letter and publication to make them better managers for the company and for themselves.

I realize fully that what I am telling you now, so briefly, about the executive development program of the Continental Telephone System, does not make a significant contribution to your fund of knowledge. To most of you what we are doing is undoubtedly old stuff and I am pleased that such is the case. Many of you, in other words, are now providing like opportunities for growth and development in your organizations and perhaps better opportunities.

The important thing about this whole matter is that you recognize what you are doing, not as a hit-or-miss conglomeration of helpful forces at work, but rather as a planned program.

Without such recognition, accompanied by full knowledge in your organization that the program exists, you will not get the results so necessary to your successful future as a company.

### *Measuring Effectiveness*

The effectiveness of any program set up by a business must be made subject to periodic measurement. The program costs money; it is set up to do a job; how efficient is it in doing that job,

*(Please turn to page 44)*

# IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH, WASHINGTON EDITOR

**Two utility cases, which should be of interest to telephone companies, to come before U. S. Supreme Court. Mobile radio system asks commission to "investigate" telephone companies in that field. Air Force continues work on SAGE.**

LAST WEEK the U. S. Supreme Court met once more for its annual "October term." The court reassembled in a general Washington atmosphere of uncertainty caused by the sudden illness of the nation's chief executive, President Eisenhower. There has even been undertone speculation as to the possibility that the Republicans might attempt to raid the highest bench, in an effort to draft Chief Justice Warren, if the President's illness prevents him from seeking reelection. But the business of the court is important enough, of itself, to get the spotlight on this annual occasion when it convenes for its fall term of arguments and decisions.

Looking over the many appeals of all kinds which have piled up during the summer recess, this correspondent fails to note any telephone cases. There may be some which could come before the highest court later on in the term. There is an interesting telephone security issue case before the North Carolina Supreme Court and the very important New York Telephone Co. case before the New York Court of Appeals. There may be one or two other rate cases at the state supreme court level—any of which might possibly get to the top before the bell rings next June on the U. S. Supreme Court's work year. But more likely these strictly telephone cases, if they go higher at all, will not get to the top before the next October term.

There were several other utility cases, however, of considerable interest to telephone companies because of legal principles which might be decided. One of these is Milwaukee & Suburban Transport Corp. v. Wisconsin Public Service Commission, 7 PUR3d 625. This case comes up on appeal from the Wisconsin Supreme Court. The case arose as a result of the purchase by the city of Milwaukee of surface transit lines, the validity of the fares charged by the city-run system, and the fairness of the return in relation to the purchase price of the property, which, in this case, was used as a rate base and which was *less* than the original cost.

The Wisconsin Supreme Court had ruled that it was all right for the Wisconsin Public Service Commission to use the bona fide purchase price of a transit utility system as a rate base, even though it was lower than the original cost of the property when first devoted to public service (adjusted for depreciation, additions, betterments, etc.).

But the Wisconsin court also held, significantly, that the Wisconsin commission had to be consistent about using such a purchase price as a rate base, even in situations where the purchase price might exceed the original cost. It will be an important precedent, especially if the U. S. Supreme Court goes along with the Wisconsin Supreme Court, or allows the lower court's decision to stand without allowing future review.

Another case which should interest Independent telephone companies involves the validity of REA financing of a so-called "super co-op" which a number of electric utilities in Kansas, Missouri, and Arkansas thought to be competitive. In this case the lower court (U. S. Circuit Court of Appeals for the District of Columbia), threw out a private utility company's suit on grounds that the mere possibility of competition between a private utility company and an REA financed co-op did not entitle the private company to sue in court in order to test the validity of arrangements between the co-op and the federal government.

If the lower court is upheld in this case, competing commercial utility companies would seem to be cut off from any right to challenge the legality of REA financed competition—although it must be kept in mind that there are differences in the rural electrification as distinguished from the rural telephone loan provision of the Rural Electrification Act.

So far there do not seem to be any other utility rate case appeals (other than the Milwaukee transit case already mentioned) which the U. S. Supreme Court would be called upon to decide at the present term. There is one appeal of a somewhat complicated and specialized character involving natural gas contract rates changed by the FPC.

However one may feel about particular supreme court decisions, we in the United States are pleased by the fact that we do at least have a supreme tribunal with a final "say so" on questions of legality. In no other major nation in the world today, not excluding Great Britain, is there such an independent supreme judiciary.

Only last week the world witnessed a sorry example of a great organization, the United Nations, (which has a constitution and a charter, but no supreme court), trying to get along without a final tribunal. If the United Nations had a supreme court, France would not have had to walk out, as it did last week, because the national assembly (by a one vote margin), decided to take up a matter which France

felt involved its own domestic business —the Algerian crisis.

Chapter I, Article 2, of the United Nations' charter provided:

"Nothing contained in the present charter shall authorize the United Nations to intervene in matters which are essentially within the domestic jurisdiction of any state."

It would appear that the act of the general asembly to go into France's territorial affairs was in violation of this provision. The United States people would probably feel the same way, in addition to being highly insulted, if the United Nations assembly had decided to act on some outside complaint (of which there are many) about the way our nation handles the race problem in the public schools or controls the island of Puerto Rico.

But the United Nations has no supreme court and the indignant Frenchmen had nothing else to do but walk out. This is not to suggest that the United Nations ought to have a supreme court, or that there would be any practical way of setting one up, much less enforcing its decision. But, the situation does suggest that if the United Nations ventures to act in open violation of its own constitution its days are numbered. One such open violation, if persisted in, would probably be enough to finish it off.

### *Mobile Radio Complains*

A complaint of "unfair competition" by telephone companies in the mobile field has been sent to the state regulatory commissions. The letter bears the signature of W. O. Nelson Jr., president of the National Mobile Radio System of Washington, D. C. Nelson condemns telephone companies for entering the business of leasing and maintaining private two-way communications systems and calls upon the state public utility commissions to ask telephone companies for an explanation of "their activities in these fields."

Telephone companies are taking the position that their activities carry out their public service obligation under the law. Ever since the use of mobile two-way communications by radio has come into popular demand by various industries, telephone companies have been asked to furnish such service on a common carrier basis. It is probable that the regulatory commissions, themselves, will be interested in having such service provided by common carriers (telephone companies) instead of by non-regulated, non-utility equipment manufacturers and sellers.

### *Work on "SAGE" to Proceed*

Despite the comptroller general's earlier technical objections, the Air Force is planning to proceed with work on its communications network for an air defense project. Comptroller General Joseph Campbell had previously objected that specific congressional authority ought to be obtained before funds appropriated for military general spending could be put into this program, popularly known as the SAGE (Semi-Automatic Ground Environment) System.

After the comptroller general had raised his technical objections, the House majority leader (R. McCormack, D., Mass.) piled into the situation with charges of "scandal" and government favoritism of big business. But, since then, the so-called "scandal" has been largely deflated by sober warnings about the importance of proceeding with this program without delay. Now, Defense Secretary Charles E. Wilson has written the comptroller general a long letter pointing to the urgency of the work and it appears that the comptroller general is not disposed to foul up the timetable.

Of course, the Air Force can go right ahead with the acquisition of land, construction of buildings, and procurement of "electronic brains" and the weapons themselves. These have all been okayed by the Congressional Appropriations Committees. It is only the communications part of the linking of the system together—which has caused the comptroller general some concern.

Secretary Wilson's letter observed that SAGE was contracted for in the same way as most armed forces communications. However, he conceded it was a much bigger project than most. Annual payments to the Bell System companies, which are designated to build the system, will run as high as 240 million dollars when the system is in use, according to tentative Air Force estimate. The Defense Secretary's letter cited the Federal Property and Administrative Services Act of 1949 as authority for the Air Force's method of contracting. Under this method, no money is voted by Congress until the network is built and being used.

Proceeding according to usual Air Force methods, telephone companies involved in this program would put up all the original capital and construction money. No money would leave the federal treasury until the circuits are used. This would save immediate expenses. The Air Force contends that it had informed Congress on several occasions of its plans and got all the appropriations it had asked for the other phases of SAGE.

But there is another method which the administration happens to favor. That is building facilities with private capital and paying back such funds by rentals over a period of time. The legal problem involves Mr. Campbell's interpretation of Section 201 of the 1949 law. Secretary Wilson's letter noted that if this section — together with subsequent delegations of authority by the General Services Administrator under it — did not authorize advance contracts such as those for SAGE, "it would serve no purpose whatsoever."

### *Modern Fairy Tales*

"Once upon a time," according to an ancient fairy tale which many of us read in our youth and have long since forgotten, there was a cruel witch who managed to separate two young lovers (prince and princess, of course), by imprisonment. The exact reason for all this escapes the writer but he does recall that the old evil character's magic medicine was so powerful that "her voice could be heard for a thousand leagues." The young lovers foiled the witch by discovering that they could "talk to each other on the rays of sunshine," and thus were able to figure out a plan for escape, reunion, conquest of the opposition, and the inevitable "happy life ever after."

Two events during the past fortnight have underscored the way in which modern technical developments have managed to capture the dreams of even the most imaginative fairy tale writers

*(Please turn to page 44)*

## 1955 CONVENTIONS

**Oklahoma Telephone Association, Huckins Hotel, Oklahoma City, Oct. 20 and 21.**

**Virginia-West Virginia Independent Telephone Associations (joint convention) Hotel Roanoke, Roanoke, Va., Oct. 20 and 21.**

**South Carolina Independent Telephone Association, Clemson House, Clemson, Oct. 24 and 25.**

**South Dakota Telephone Association, Cataract Hotel, Sioux Falls, S. D., Nov. 3 and 4.**

**Alabama-Mississippi Telephone Association, Thomas Jefferson Hotel, Birmingham, Ala., Nov. 14 and 15.**

**Georgia Telephone Association, DeSoto Hotel, Savannah, Nov. 17 and 18.**

**Florida Telephone Association, Daytona Plaza Hotel, Daytona Beach, Nov. 21 and 22.**

# REA Approves Seven Telephone Loans Totaling $1,896,000

The Rural Electrification Administration made seven loans during the week of Sept. 25 to Oct. 1 to improve and extend telephone service in rural areas of Maine, Minnesota, Missouri, Nebraska, Kansas and Illinois. Total of the telephone loans was $1,896,000, the U. S. Department of Agriculture announced on Oct. 5. Details follow:

Eastern Telephone Co., West Enfield, Me., on Sept. 27, was allocated $208,000 to improve and extend rural telephone service in Penobscot County.

The company now provides magneto service to 495 subscribers over 94 miles of line. With the REA loan, it plans to improve service for the existing subscribers and to offer initial service to 219 farm families and other rural people in the area.

Of the existing line, 28 miles will be used in the expanded system and 66 miles rebuilt. In addition, the borrower will add 11 miles of new line. Present plans call for a new automatic central office building at West Enfield to replace the existing magneto facilities. The completed system will consist of 105 miles of line.

Carlon M. Grosse is president and manager of the Eastern Telephone Co.

*

Manchester-Hartland Telephone Co., Manchester, Minn., on Sept. 28 secured approval of a loan of $191,000 to finance the extension and improvement of rural telephone service in Freeborn County and small portions of Steele and Waseca counties.

The new borrower, a commercial company, proposes to use the loan funds to convert the existing system, furnishing magneto service to 350 subscribers, to automatic operation and to add facilities for 82 additional rural families now without telephones.

Of the existing 121 miles of line, 111 will be rebuilt, 6 used in the expanded system and 4 retired. The company plans to add 16 miles of new line and build new automatic central offices in Hartland and Manchester. The borrower is contemplating service without toll charge between the two exchange areas. The completed system will consist of 133 miles of line.

Arthur Harpedahl is president and Chester Hanson is manager of the Manchester-Hartland company.

*

Bolivar, (Mo.) Telephone Co., on Sept. 28 gained authority to borrow $159,000, its second REA loan.

The borrower proposes to use these REA loan funds to provide facilities to serve an additional 323 rural subscribers in the service area. As a nucleus for this extended service, the Bolivar Company has acquired the Morrisville Telephone Co., now furnishing magneto service to 116 rural subscribers.

Present plans include construction of 96 miles of new line and a new automatic central office at Morrisville. The new facilities will make it possible for the Bolivar company to improve service for the existing subscribers and to serve 207 rural families in the Morrisville area now without telephones.

The two loans to the Bolivar company total $626,000, with which the borrower plans to furnish modern service to 1,618 subscribers in Polk County. When the proposed system is completed, it will consist of 280 miles of line.

J. M. Roberts is president of the Bolivar Telephone Co.

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Authorization to borrow $390,000 was extended also on Sept. 28 to the Northeast Nebraska Telephone Co., Hubbard, to improve and extend rural telephone service in Dakota, Dixon and a small portion of Wayne counties.

The borrower, a new cooperative, plans to use these loan funds to provide a modern telephone system to serve 761 rural subscribers in northeast Nebraska.

The following acquisitions are planned by the Northeast Nebraska cooperative to form the nucleus for the new telephone service: Concord Farmers & Merchants Telephone Co., Jackson Telephone Co., Dixon Telephone Co., Martinsburg Telephone Co., plus 5.5 miles of farmer-owned rural lines. These facilities are now furnishing magneto service to 445 rural subscribers.

The borrower is planning to construct new automatic central office buildings at Dixon, Jackson and Martinsburg, and to build 193 miles of new line. About 122 miles of the existing line will be rebuilt for continued use in the proposed new system. These changes will result in improved service for the existing subscribers and initial service for 316 rural families in the area now without telephones.

Howard Rasmussen is president of the Northeast Nebraska Telephone Co.

*

United Telephone Association, Dodge City, Kan., on Sept. 29 received approval of its application to borrow $469,000, its third REA loan.

The borrower plans to use the loan funds to expand its service area into Meade County and a new area in Clark County, acquiring the common battery and magneto facilities serving Ashland and Englewood as a nucleus. These facilities, now owned and operated by Western Light & Telephone Co., presently serve 757 subscribers over 255 miles of line.

The cooperative's plans include conversion to dial operation and construction of 62 miles of new line in the expanded area. About 225 miles of the existing line will be used or rebuilt. The changes which the association has under consideration will provide modern dial service to the present subscribers and 123 farm homes and other rural establishments without telephones in the new area.

Loans to this association to date total $1,715,000 for 1,545 miles of line and nine exchanges, to serve 3,144 rural subscribers in Clark, Finney, Ford, Gray, Haskell, Hodgeman, Meade and Ness counties.

The Copeland, Hanston, Ingalls, Kingsdown and Spearville automatic exchanges and the common battery office at Cimarron already are in operation. The Montezuma area is nearing completion; Ashland and Englewood, the remaining two exchanges, are provided for in the Sept. 29 loan.

Frank D. Patterson is the president and Carl Brecheisen is manager of the United Telephone Association.

*(Please turn to page 48)*

# NEW DEVELOPMENTS

# in Independent Telephony

By RAY BLAIN

THIS is the last article in a series of four, in which the technical editor of TELEPHONY describes various new items of equipment, which should be of interest to all progressive Independent telephone companies. The third article appeared in the Oct. 8 issue. Readers desiring more information on any of the products described may write to Mr. Blain in care of TELEPHONY.

*Three-Pair Distribution Wire.* One wire manufacturer has broadened its line of multi-pair distribution wires to include three-pair. Previously, 6, 11 and 16-pair have been available.

Used instead of open wire when three pair circuits are needed, this wire can be attached to the pole making a neat, inconspicuous installation and reducing the amount of trimming required in wooded areas. Use of cross-arms is unnecessary. On already filled cross-arms, capacity can be increased by attaching the built-in messenger to the pole below the cross-arms. This wire is especially economical for temporary use before sheathed cable is installed since it may be taken down and reused.

Similar in construction to the 6, 11 and 16-pair wire, the three pair wire has No. 19 AWG soft copper conductors, black polyethylene insulation and jacket of color-coded polyvinyl chloride. Pairs are color-coded black-blue, black-green, black-brown and are twisted with varying lays to minimize cross-talk.

Pairs are cabled around a polyethylene-covered, 1,800 pounds breaking strength steel core. Outside diameter of the wire is approximately .450 inch. This wire is available in 4,000 foot and 2,000 foot lengths.

According to the manufacturer, it is characterized by low-loss transmission, low capacitance, high dielectric strength and excellent weather resistance. It is easy to install, light weight and self-supporting.

*Inside Wiring Cable with Rip Wire.* To facilitate removal of the outer jacket, inside wiring cable is now being furnished with a steel rip wire.

The rip wire is laid longitudinally beneath the jacket and over the paper separator. To strip the jacket, it is only necessary to slit it for a short distance directly over the rip wire. The rip wire is then grasped with pliers and the jacket ripped for the desired distance.

Advantages of this new construction include speedier jacket removal with consequent lower installation cost and freedom from danger of damaging the conductors, as can readily happen when a knife is used.

*Hydraulic Lift Platform.* This lift should prove ideal for use in the installation and maintenance of long cable runs along the ceiling or sides of buildings. This platform will handle a payload of 500 pounds. It has three standard platform heights of 16, 20 and 24 feet. This gives working heights of 22, 26 and 30 feet when 6 feet is allowed for the height and easy reach of the workmen. With the platform in the folded position, it passes easily under a 6-foot 5-inch overhead. The 24 inch diameter platform floor is hinged at one edge and secured in the upright position by a safety lock. The over-all width of the unit in the folded position is only 30 inches. This makes it easy to store when not in use.

**Fig. 22. Hydraulic lift platform.**

The lift is extremely solid when in use. A small foot-operated brake presses against the floor directly beneath the hydraulic column, preventing it from rolling, and taking the full load while the lift is in use. The wheels act only as out-riggers to stabilize the entire unit. The time required to raise the lift to its full 16 foot height is less than 45 seconds. A flick of the foot (as easy and quick as turning off a vacuum cleaner) and the unit is ready for the next job.

The unit is powered by a 110-volt, single phase 60-cycle ac motor equipped with 35 feet of extra-heavy duty neoprene-covered three-conductor cable. If the power supply fails while the lift is in use, a manual release valve located within easy reach on the top of the body will enable a safe descent. Duplicate controls are also standard equipment. In addition to the controls on the platform for use by the operator aloft, a separate set is mounted on the lift body for use by an attendant on the floor. (See *Fig. 22.*)

*Hydraulic Lift.* This unit has a 500-pound payload and is built with working heights of 27, 30, 33 and 37 feet. It can be customer-installed on any truck in about four hours. The platform size, shape, and extendability is at the customer's direction. This lift

represents the ultimate in remote control, one-man operation. He can drive to the work location, engage the power take-off, raise the collapsible guard railing, then ride high. Controls on the work platform raise and lower the platform to any position, rotate the offset platform 180 degrees in any direction, and actually drive the truck down the street, checking lines and cables quickly, and stopping at any point for closer examination, or to make repairs. The unit collapses to 10 inches below the cab top and does not protrude over either side. (See *Fig. 23.)*

*Automatic Switching System.* A new automatic switching system, known as the "By-Path" crossbar, is being introduced this year.

The system takes its name from the "by-path" set up during selection, between the originating switch and a register and from a selector to a terminating group. Several operations as follows are completed during the brief time required to call:

(1) Finding the originating line.
(2) Learning the terminal location of the called station.
(3) Learning the type of ringing required at the called station.
(4) Scanning all routes between the two stations and selecting the first available.

This action all takes place on the "by-path" without adding traffic to the "main roads" or talking paths until everything is set up and ringing is started, according to the manufacturer.

The system employs one type of finder-selector equipment, crossbar switches. The circuitry, we are advised, is designed to utilize the advantages of telephone relays in their most efficient application. The control of all switches in each exchange is concentrated in relay assemblies known as markers. Because of the fractional time required for each operation, the markers provide capacity far beyond any traffic to which they ever will be assigned, it is said. It is further claimed that the efficiency of the equipment is high because of the low ratio of idle time compared to arrangements requiring a greater number of control relays for each switch. Maximum line availability with minimum equipment is a basic feature of "By-Path" design.

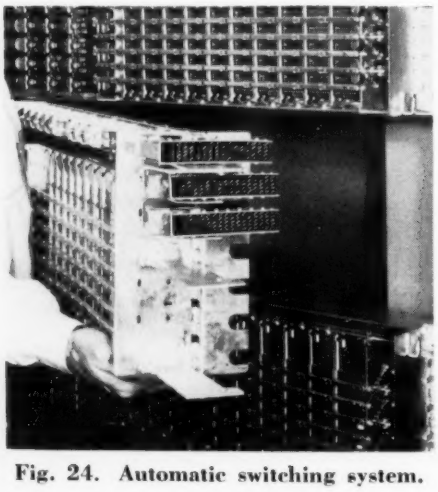


**Fig. 24. Automatic switching system.**

**Fig. 23. Hydraulic lift.**

Subscribers' lines in this system all terminate on primary switches, 25 lines per switch. This is the only termination of these lines in the system. The same switch is used for completion of both originating and terminating calls.

This switching system is designed on a "block-built" jack-in principle utilizing crossbar switches and relay units. It is usually installed in groups having a capacity of 500 lines each. It is expandable within any 500 group, 25 lines at a time, by mounting the jacked-in assembled units. It is further stated that this system may also be used as additions in the expansion of any type of dial switching equipment presently in use.

The over-all floor space occupied by the typical "By-Pass" crossbar system, with terminal per station, including power panels, main frames and generous aisle spacing is as follows:

| *Total Line Capacity* | *Total Sq. Ft.* |
|---|---|
| 1000 | 480 |
| 2000 | 850 |
| 4000 | 1700 |

The above figures are approximate only as exact measurements depend upon the specifications of each system. The equipment is all contained in uniform racks 10 feet 2 inches high by 3 feet 3 inches wide, and 17⅛ inches deep. (See *Fig. 24.)*

*Automatic Ticketing System.* The principal features of this ticketing system are: (1) The calling line is identified automatically but the subscriber dials his own party digit, and (2) register-sender-translator equipment routes the call to its destination automatically.

The customer dials the following information:

(1) Access code.
(2) Calling party digit.
(3) Complete 2-5 called number.

The access code may be one or more digits. Its purpose is to select the ticketing equipment. The party digit is the last digit of the customer's own number in a terminal-per-line office, or an arbitrarily assigned digit in a terminal-per-station office. The called number may be seven or 10 digits, depending on whether or not an area code is dialed.

It is proposed that access code and party digit be printed in a special location on each dial number card. The customer's instructions will be to dial the number appearing on his card, and then dial the called number. (See *Fig. 25.)*

*Tools for Two-Man Crews.* For the past several years there has been an ever increasing trend toward the use of two-man construction crews in the utility construction field. With this trend, has come the need for more and better mechanized equipment to aid these men in performing the work formerly done by a much larger construction crew. One company has devoted

*(Please turn to page 50)*

**Fig. 25. Automatic ticketing system.**

# THE Operator's Corner

By MAYME WORKMAN — TRAFFIC EDITOR

IT IS ALWAYS a thrill to learn and to write about the experience of a switchboard operator when her action results in "service beyond the call of duty" because she is alert when a condition occurs which is not normal.

We salute Caroline Penner, Beatrice, Neb., operator for the Lincoln Telephone & Telegraph Co., who made headlines recently when she was instrumental in alerting police to an attempted burglary at a Beatrice supermarket.

Caroline noticed that the receiver was off the hook at the supermarket early Saturday morning. She listened in, heard noises as if someone were moving about and promptly notified police. When officers arrived at the store, they found three men busily at work trying to crack a safe. The men were charged with breaking and entering and possession of burglary tools.

Good work, Caroline!

And while we are on the subject of quick action on the part of a switchboard operator, I would like to tell you about the service of one operator in Bountiful, Utah, which is credited with saving the life of one of her subscribers.

The ailing woman, Mrs. Jemima Clawson, 87, suffered a severe pain in her side about eight o'clock in the evening. She reached her telephone, cried "Help," and then collapsed.

Mrs. Thail Trump, evening chief operator at Bountiful, traced the call. She then notified Bountiful Marshal Turner Burningham and West Bountiful Marshal Franklin J. Hatch.

The marshals sped to the Clawson residence, notified a physician and located the victim's son who was doing farm work about one mile away. Marshal Hatch took Mrs. Clawson to the hospital in Salt Lake City. Mr. Clawson credited the action of Mrs. Trump with possibly saving his mother's life.

So we also salute Mrs. Trump and we are proud of our co-workers in the Telephone Industry, both Bell and Independent. Caroline Penner is employed by an Independent telephone company and Mrs. Trump is an employe of the Bell Mountain States Telephone & Telegraph Co.

There is no difference between the Ideals of Telephony and the "Spirit of Service." We find them among both Bell and Independent telephone operators. They all have the same objective in view—to give the best possible telephone service to their customers, to help them in time of need, and to be ever alert to any situation which is unusual and which requires special action on their part.

What a satisfaction it must be to Caroline Penner to know that her quick action resulted in avoiding a loss to

CAROLINE PENNER

one of her subscribers, and certainly Mrs. Trump must feel gratified in knowing that possibly her action resulted in prolonging the life of a dear old lady.

Days go by when apparently all calls are the same—just routine—and yet, if we could hear the conversations that take place, we would be amazed to know that the connections established result in joy, accomplishment, peace of mind, and sometimes, sorrow and disappointment. We have no way of knowing, but of this the operator may be assured, that she is a most important cog in the business, social and day-to-day life of the people of her community.

The thrill of sitting at a switchboard and handling telephone calls cannot be overestimated. Operators who are now retired never tire of reminiscing about the days when they worked at the switchboard. Get a group of them together, and you may be sure their favorite topic will be—Telephony. They will usually begin by saying, "Do you remember"—and on and on they go.

Time has brought changes in the Telephone Industry, but the hearts of the operators have not altered. They are just as eager to be of service to their customers today as they were 40 and more years ago. In the early days of Telephony, the operators had little in the way of efficient equipment to work with, but they did a good job, nevertheless. Today, the operator's work tools are the last word in perfection, and what transmission we have today! The work of the operator has become more technical through the passing years, but I believe more pleasant, too. We are living in an era of rapid progress, generally speaking, and certainly this is true of our own industry.

We cannot predict what the future holds in store, but of this we may be sure: as long as operators handle telephone calls, there will be occasions for heroisms, alertness and quick thinking, and we are confident, too, that the operators at the switchboards will be on the job and ready to assist their customers in every way possible. Isn't it good to know you are engaged in an industry which affords so many opportunities to be of service to others!

## Traffic Questions

(1) In quoting rates to operators, which rate should be quoted?

(2) What calls are classified as "International Calls"?

*(Please turn to page 50)*

# Protects service with diesel plant

***General Telephone Co. of California invests $2 million in standby power equipment to insure continuous service and the operation of its toll ticketing equipment in the event commercial power fails***

A NEW AUTOMATIC diesel power plant has been put into service by General Telephone Company of California to insure continuous operation of the General System's largest single installation of automatic toll ticketing equipment. The 300-hp. Fairbanks-Morse diesel is part of the company's 1955 improvement program at the West Los Angeles central office which involves the expenditure of more than 2 million dollars.

The automatic equipment substantially increased electrical load and at the same time made it more imperative to prevent interruption of power supply. With automatic toll ticketing, each director shelf has its own 24-volt ac pulsing motor and each ticketer and tape perforator has additional ac power requirements. Failure of ac supply to this equipment even for very short duration could have serious consequences. Failure of power to the directors would result in complete loss of pulsing for the entire office and disruption of telephone service to the public. Loss of ac power to the automatic ticketers would mean loss of the entire toll billing for the period of power failure.

Two alternatives were considered to provide standby power protection: First, doubling the size of the storage battery installation to provide a five-busy-hour reserve for the increased electrical load; second, a two-busy-hour battery reserve with a diesel-generator to supply emergency ac requirements directly, provide dc current through motor-generator sets and rectifiers, and operate the battery charger.

It was estimated that the five-hour reserve for the West Los Angeles office with its new automatic equipment would require an extremely large battery at a cost of approximately $78,000. In addition, special floors would have to be constructed to carry the additional weight. A two-hour battery would cost about $34,000 and a diesel plant could be installed for substantially less than the $44,000 difference. Space and foundation for the diesel would be less costly than the comparable charges for the five-hour battery.

Another consideration that influenced General Telephone's engineers was the longer service life. The battery would last a maximum of 15 years, while a heavy-duty standby diesel should serve for 30 years. Also, unlike the battery, the diesel is capable of producing rated output continuously for an indefinite period, assuring continuity of telephone service regardless of the length of commercial power interruption.

With a diesel to supply emergency lighting for vital operating rooms and equipment buildings, it also would be unnecessary to provide the customary 48-volt emergency lighting system.

It was on the basis of these facts that C. M. Davis, general equipment engineer, concluded that a diesel-generator would provide the best and most economical standby power protection for offices and toll centers with automatic toll ticketing equipment.

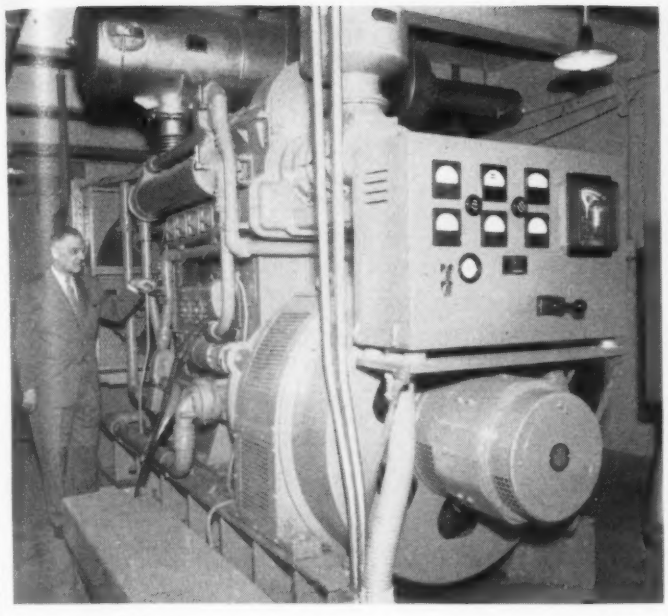
The engine chosen for the West Los Angeles office is an opposed-piston, two-cycle diesel with four cylinders, 5¼-inch bore and 7¼-inch stroke, rated at 300 hp. at 1,200 rpm. The OP is a heavy-duty engine capable of long, efficient operation, yet is relatively light and compact. The four-cylinder engine has an over-all length of just 7 feet 10½ inches. The diesel drives a 200-kilowatt alternator to generate three-phase, 60-cycle, 240-volt current.

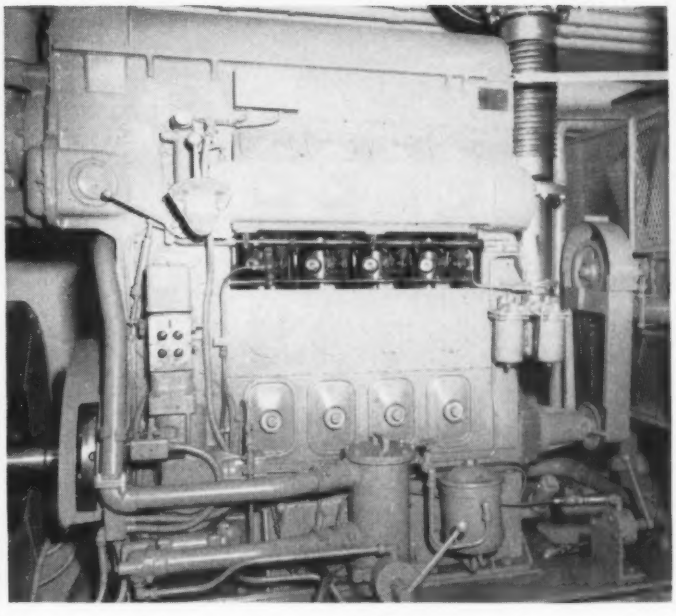
The engine is arranged to start instantly and automatically upon failure of the commercial power supply. Normally, commercial power passes through an automatic transfer relay to the single phase 115-volt, 60-cycle, three-wire lighting and building service circuits. Interruption of this supply closes contacts in the transfer relay which activate the diesel's solenoid-controlled electric starter. The diesel has started and picked up the emergency single-phase load within six seconds.

When the diesel starts, the 240-volt, 60-cycle, three-phase current passes through a transformer where it is reduced to 115-volt three-wire single phase, then through the automatic transfer relay to the emergency lines. Thus, the diesel automatically picks up operating room lighting, "panic" lighting for the central office building, lights for operation of the manual switchboard, and power for the timing clocks on the manual boards. The 115-volt current operates the tape perforators and is reduced to 24 volts to run the ticketers and directors.

The diesel also sends three-phase 240-volt power to a manual transfer switch in the building service panel. By throwing this switch, an operator sends power to telephone equipment. Motor-generator sets and rectifiers convert it to 48-volt dc current to power automatic switching equipment. The ac current also runs the battery chargers and powers the ringing machines.

It is apparent that the diesel can swiftly take over emergency lighting and operation of all equipment vital to continued service and billing.





**LEFT PHOTO: Protecting customer service and toll billing against power failure is this new 300-hp. opposed-piston diesel. C. M. Davis, general equipment engineer of General Telephone Co. of California, is inspecting the new engine. RIGHT PHOTO: Another view of the diesel.**

The diesel at West Los Angeles was arranged not only for swift, automatic starting but also for quiet, dependable operation with a minimum of attention. The power unit and all accessories are installed in a small basement room. Engine and generator are mounted on a steel base which rests on vibration isolators. Exhaust gases pass through flexible hose to a horizontal snubber suspended from the ceiling, then up a pipe to the roof two stories above. Central Office Maintenance Supervisor, J. E. Scherrei, reports that there is no perceptible vibration in the operating room above and no engine noise outside the engine room.

The engine is virtually self-sufficient with accessories mounted right on it or beside it on the steel base. Cooling water is circulated by an engine-driven centrifugal pump through the diesel and through an air-cooled radiator. The radiator fan is driven by V-belts from an extension of the engine's lower crankshaft.

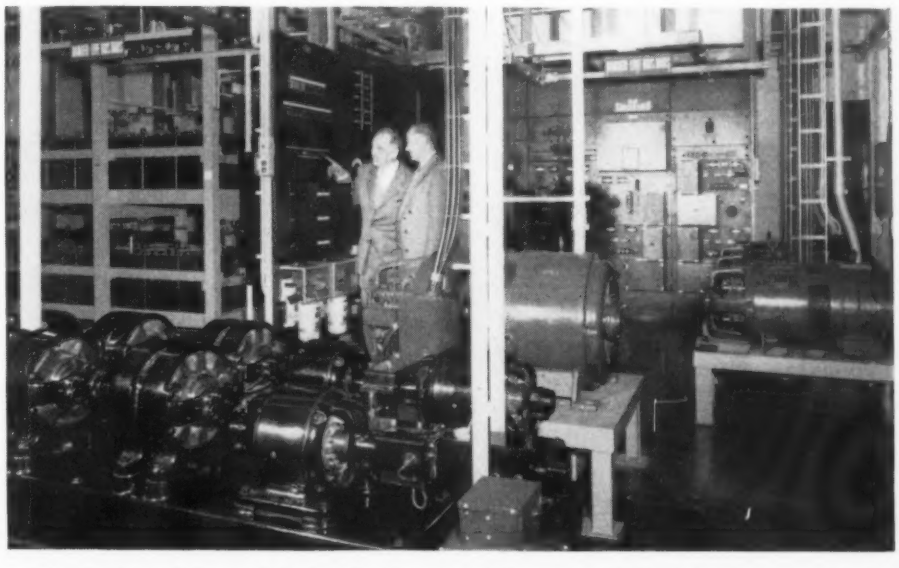
Lubricating oil is sent through the diesel under pressure by a built-in pump. Included in the lube circuit are a shell-and-tube oil cooler, a full-flow strainer and a by-pass cartridge type filter. Fuel oil from storage is pumped through a duplex filter before reaching the injection pumps.

Scavenging air is drawn from the room through a filter mounted on top of the engine-driven blower. Air is ducted to the engine room from outside the building and is exhausted through another duct by a blower-type fan. The engine control panel with voltage regulator, voltmeter, ammeter, kilowatt meter, frequency meter and engine hour meter, is mounted above the engine's direct-connected exciter. Batteries for the diesel's electric starter stand beside the engine and are served by an automatic trickle charger.

To protect the engine, there is an alarm and automatic shutdown actuated by low lube pressure or high jacket water temperature. The alarm also sounds if the engine fails to start after five automatic cranking cycles.

The General Telephone Co. of California, largest Independent telephone company in America, has consistently improved equipment at the same time that it expanded tremendously its service volume. By June, 1955, General served 667,987 telephones in a seven-county area from the San Joaquin Valley on the North to Laguna Beach on the South and including about 25 per cent of the population of Los Angeles County. Telephone plant was valued at 214 million dollars with another 100 million dollars scheduled to be spent in 1955, 1956 and 1957.

The West Los Angeles exchange exemplifies the company's growth. On Dec. 31, 1947, this office served 26,031 telephones and had an investment of $4,757,843 in telephone plant. On Dec. 31, 1954, plant investment was $14,-851,261. By Aug. 1, 1955, the number of telephones served had reached 56,000.



**C. M. Davis and Central Office Maintenance Supervisor J. E. Scherrei inspect telephone power equipment at West Los Angeles. In the event of interruption of normal commercial supply, the diesel will feed power to the motor-generator sets and rectifiers to provide dc power for telephone equipment.**

**Installation of Automatic's new Type 80 Monophone is remarkably quick and easy. It offers a worthwhile saving in costly man-hours!**

# *A screwdriver's all you need!*

Installing a Type 80 Monophone is surprisingly quick, unbelievably easy. A screwdriver's the *only* tool required, and in a few short minutes your man's on his way to another job. Here's substantial savings in installation time!

Let's look at the features that make this speed possible:

- *No soldering*—all wires terminate in spade clips which attach to screw terminals.
- *Unitized construction*—allied components such as ringer and ringing condenser are screw-mounted together as a unit. Pick a ringer and the right condenser comes with it.
- *Simple adjustments*—for example, the line loop compensator. A mere twist of a screwdriver, and it's set!

Men who are using Type 80's are warm in their praise of its simple installation. They're pleased with its smart styling, low maintenance, fine transmission, and other advantages, too. Order Type 80's today. Address: *Automatic Electric Sales Corporation, 1033 W. Van Buren St., Chicago 7. Or call HAymarket 1-4300.*

INDEPENDENT

**AUTOMATIC ELECTRIC**

ORIGINATORS OF THE AUTOMATIC DIAL TELEPHONE

# THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITOR

DESPITE OPINIONS of some to the contrary, there will be a lot of aerial telephone plant placed underground during the next few years.

In many congested areas, aerial leads are becoming entirely too heavy and clearance is a problem growing more serious by the day. However, this does not imply that the amount of aerial plant will be materially reduced for an increased amount of wire and poles unquestionably will be required for many years to meet the needs of our rapidly expanding communications systems.

•

The statement that old telephone men never change their minds is not true. A few years ago, if it was suggested that exchange cable be maintained under constant gas pressure, some of the old-timers would start an argument. Now, many of these men readily admit the numerous advantages to be gained by the use of pressurized cable and are taking action to provide it.

One old-timer advised us just recently that when we replace all paper-insulated cable with plastic insulation and then maintain it under constant pressure, cable trouble will be a thing of the past. Perhaps this ideal condition is not so far in the future as you might think.

•

The present worry over automation as a threat to the working man is by no means new. Back in 1830, it was predicted that dire disaster would befall if steam power were used in factories.

At that time the propaganda went so far as to suggest that mothers have no more children since the proposed use of steam would do away with any possibility of jobs for them when they grew up.

•

The use of the outdoor paystation booth is increasing at a tremendous rate. Installations at the present time appear to be confined primarily to filling stations and parking lots.

We note, too, that installations on or near bathing beaches are paying big dividends. Drive-in restaurants also appear to be an ideal location for this service.

One location that apparently has been overlooked up to now is the golf course. Certainly a few outdoor booths scattered around any of our busy golf courses should do a big business.

•

Telephone calls to foreign points are now referred to by the Bell System as "international." This term replaces "overseas" call.

A newly adopted procedure also permits more rapid handling of these calls. Under this new plan, the long distance operator simply connects the calling party with the operator at the "circuit-terminal office" where the radio-telephone circuits terminate.

This second operator will handle the entire call. The long distance operator at the point of origin will no longer be required to prepare a ticket on the call or relay information for the calling party.

International calls are those from the United States and Canada to other countries. Telephone calls between the United States and Canada, and calls to and from certain border points in Mexico are served by centers in the United States.

•

The commercial office of the Chesapeake & Potomac Telephone Co. at St. Michaels, had a problem resulting from its being staffed by only one representative. The problem was how to keep the office "open" for telephone calls when the lone representative had to leave during the day to make a bank deposit, get the mail, or go to lunch.

This was solved by the installation of an automatic telephone answering device. This installation was so successful that, in addition to solving the office problem, it also generated six customer requests for similar service within three months. The answering device is now being installed in other small business offices of the Chesapeake & Potomac Co.

•

A middle-aged man complained to a psychiatrist that he had developed a habit of making long distance calls to himself and it was costing him money. He was advised to try reversing the charges.

•

While visiting a telephone exchange recently, we were impressed by neat wall racks in the equipment rooms designed to hold spare fuses of all types. These spare fuse holders were neatly stenciled to indicate the capacity of the fuse and where it was to be used.

This is a small item, but it is most important when a fuse blows and a spare must be located quickly to restore service.

•

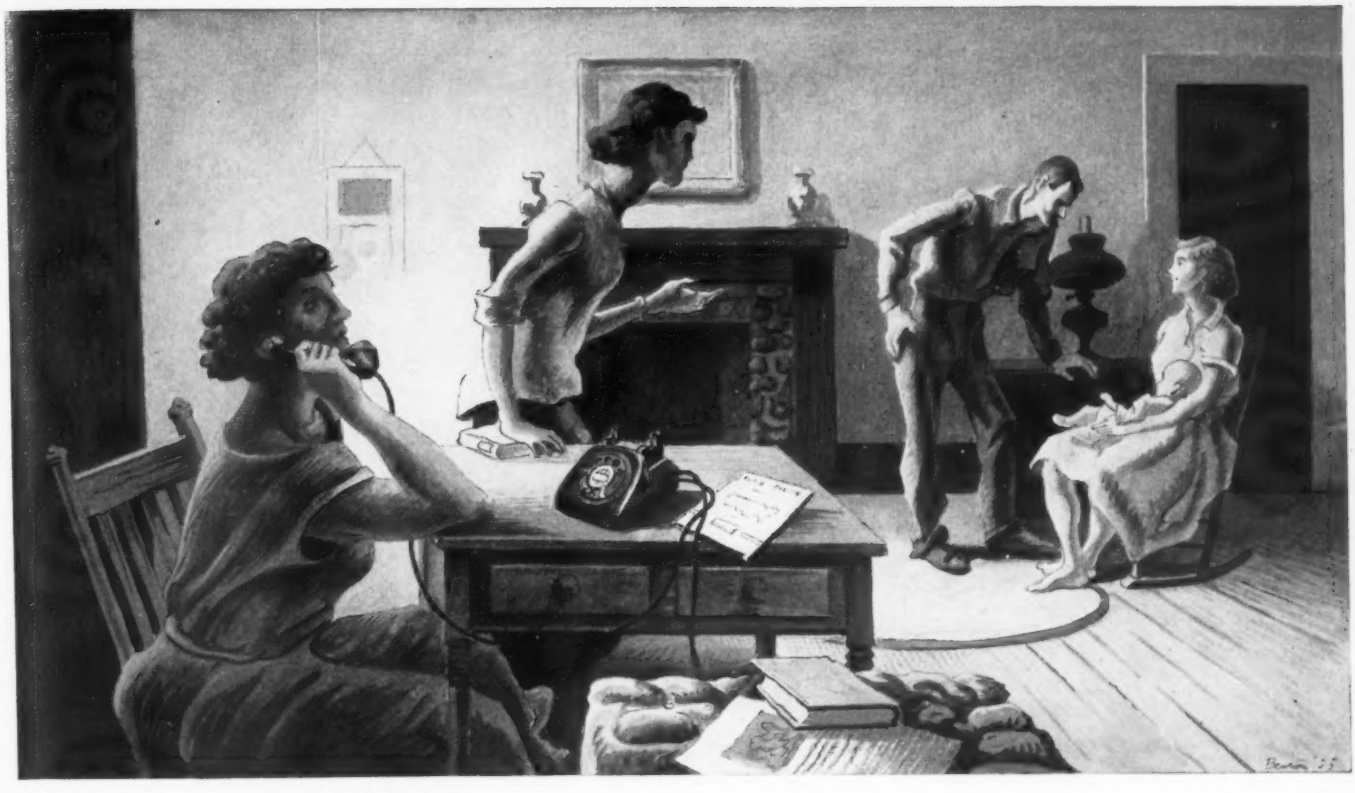
We visited an ordnance test station recently in which an underground cable was installed in the rear and near the big gun emplacements. This cable and conduit had been damaged beyond repair by the miniature earthquake created as a result of the vibration from the firing of the big guns.

The cable was actually bounced off the racks in the manholes. To say the least, this is a novel type of telephone cable trouble.

•

We noted a telephone truck the other day that carried a sticker on the dash which stated: "Do not back into trouble."

There is little doubt that constant reminders of this nature can do a lot of good.



## FAMILY COUNCIL

BY Thomas Hart Benton

The telephone brings even far-off members of the family to the council table in voice at least.

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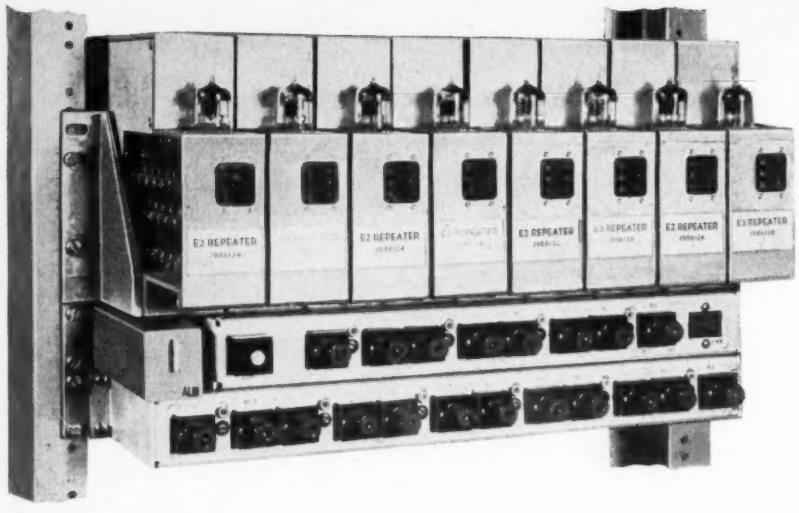


**The odd numbered repeaters on this mounting are of the series negative impedance type. The even numbered ones are of the shunt type. Each pair, composed of a series and a shunt repeater are connected to an inter-office trunk. Bottom strips contain fuse posts for power distribution. — Photo courtesy, Bell Telephone Laboratories.**

# *Voice Frequency Repeaters*

Copyright 1955 by Telephony Publishing Corp.

**By HAROLD B. McKAY**

## *PART 6— Shunt Negative Impedance*

IT WAS SHOWN in the previous chapters of this series that an amplifier could be connected in a telephone circuit in a manner which made it appear as a negative resistance. Negative resistance was shown to be a theoretical condition in which a circuit element behaved in an opposite manner to a regular resistance. That is, instead of a voltage drop, there would be a voltage gain across a negative resistance; instead of taking power from the circuit, it would supply power, and instead of the current traveling with the voltage, it would travel in the opposite direction.

An ordinary amplifier, which has its input and output connected together so that they aid, will behave as a negative resistance or impedance. Described in the earlier chapters was a repeater which was placed in series with the telephone line. Because, in order to understand the effects of alternating current, it is necessary to assume that the current stands still with a given polarity for a moment, the original speech current entering the repeater can be regarded for a moment as a dc battery.

The amplified speech may be regarded as another battery of higher voltage. In the series repeater, these two make-believe batteries must be in series. When batteries are in series, opposite poles are connected up—that is, the plus of one battery connects to the minus of the next. Thus the input and output voltages are opposite in phase, or polarity.

It was shown that this arrangement was the same as adding negative re-

## Reprints Will Be Available

**This is the sixth of a series of nine articles—six on "Voice Frequency Repeaters" and three on "Power Supplies for Repeaters and Carriers."**

**The author, Mr. McKay, will be remembered for his three series of popular articles on "Principles of Microwave Operation"; "Electrical Principles Used in Carrier Systems"; and "Corrosion of Underground Cables" and other articles published in TELEPHONY.**

**These repeater articles will be invaluable as employe training material and if firm orders are received for a sufficient number of reprints (in booklet form) to justify reprinting, they will be available following publication of the nine articles.**

**Telephone companies desiring reprints are asked to enter their reprint orders during publication of the articles. Prices of the booklet form of reprint are as follows:**

| | | |
|---|---|---|
| 1- 100 copies | each | $.85 |
| 101- 200 copies | each | .80 |
| 201- 300 copies | each | .75 |
| 301- 400 copies | each | .70 |
| 401- 500 copies | each | .65 |
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| Over 1,000 copies | each | .50 |

sistance, or more power to the circuit, and as a result more current would flow in the line. Objectionable echoes would occur if the line became too long, or the amplification too great. This limits the use of such repeaters to long exchange trunks and lines, and makes it undesirable for toll connecting use.

A remedy for this condition is another type of negative resistance repeater which will counteract the echoes created by the series type.

Actually, under negative impedance theory, the negative apparatus may be connected either in series or in parallel with the line. However, again assuming the original voice voltage and the amplified voice voltage to be batteries for a moment, it will be seen that if they are to be connected in parallel, then like poles must be connected together, instead of opposite ones, as in the series arrangement.

Therefore, a shunt negative resistance repeater uses two vacuum tubes in cascade, which means the polarity is reversed once going through the first tube, and reversed again in the second, which puts it back where it started.

The polarity of the output at any one instant, is the same as at the input of the amplifier. Of course, the voltage at the output is higher than at the input because of the amplification received.

This would ordinarily mean that the power from the output would go back into the input and cause singing, but both are connected through a Wheatstone bridge arrangement, whereby the input and output are connected to opposite corners of the bridge.

*Fig. 6.1* shows a simplified schematic of a shunt type negative impedance repeater. The input to the amplifier

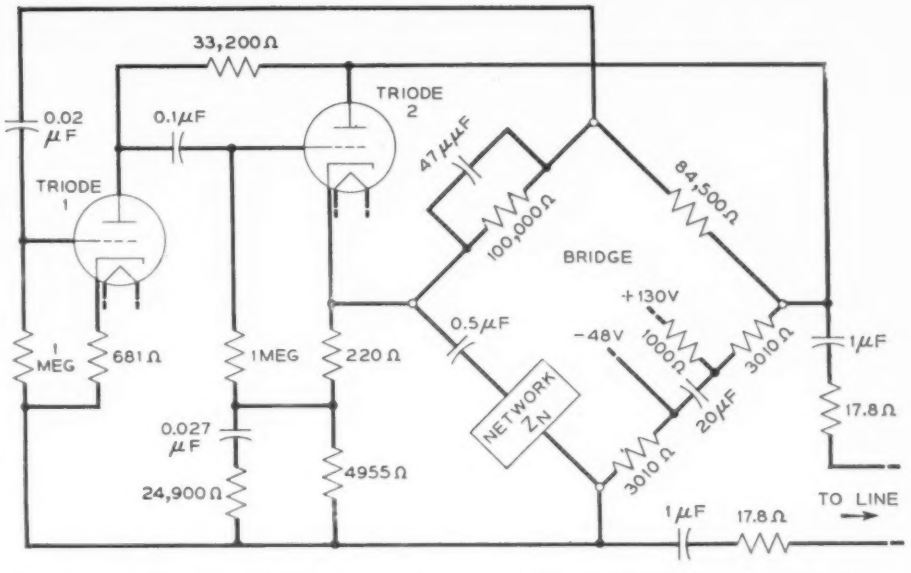



**Fig. 6.1. In this simplified schematic of a shunt negative impedance repeater, the incoming voice is routed through the resistance bridge to triode 1 where it is amplified and passed to triode 2, thence back out on the line. The bridge prevents the output from feeding back into the input.—Courtesy, *Bell System Technical Journal*.**

is the grid and cathode of triode tube No. 1. It is connected across the top and bottom corners of the bridge. The output is the plate and cathode of triode No. 2. The output is connected to the side corners of the bridge.

### *Bridge Circuit*

The line and balancing network are arms of this bridge. Hence, the amount of current or voltage in any part of the bridge is determined by the line and the network, both of which are variable. When adjusted for best performance and placed in shunt with a telephone line, speech signals reaching the amplifier terminals will, in effect, be given a boost and sent along the way.

In actual practice, this shunt type repeater may be connected to center taps of the primaries of the transformer used in the series type repeater. This is shown in *Fig. 6.2*. Remember that the series repeater caused echoes, because the whole telephone line, from transmitter to receiver, is a series circuit, and the added current supplied by the repeater went back to the talker as well as to the listener.

Now, with the shunt repeater in the circuit, the amplified voltage as it leaves the repeater divides, part going back to the transmitter and part going to the receiver. That is, the transmitter and receiver are both in parallel with the shunt receiver. Therefore, while the transmitter current goes around the series path as indicated by the dotted arrows, the amplified voltage from the repeater takes two parallel paths (solid arrows).

The result of this is that the amplified current going back towards the transmitter is going in the opposite direction to that coming out from the transmitter. While the two would add in a series circuit, the effect is to cancel out in the parallel circuit. Towards the receiver, the original and the amplified voltages are in the same direction, thus, assist rather than oppose.

Therefore, the echo back to the transmitter is cancelled or reduced, and the voltage to the receiver is increased or amplified as it should be.

The shunt repeater, unlike the series device does not use an input-output transformer. The bridged impedance or resistance is purposely made high so that it will not short out dc dialing or signaling pulses, or low frequency ringing. Thus, the advantage of having no relays in the case of the series

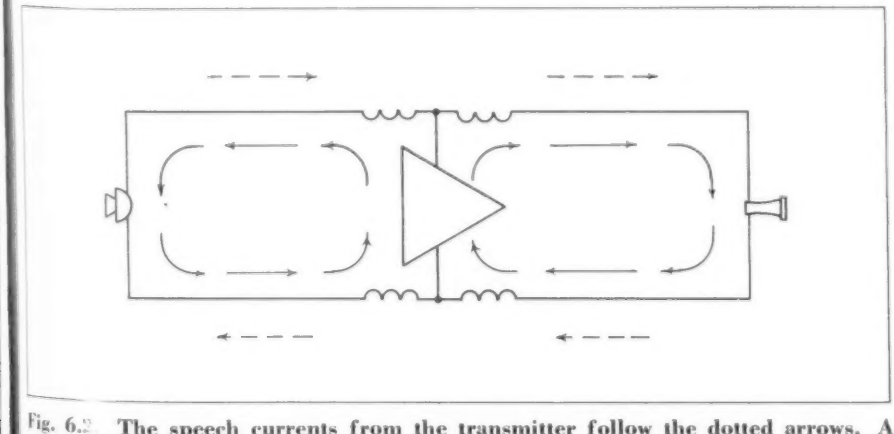


**Fig. 6.2. The speech currents from the transmitter follow the dotted arrows. A shunt repeater is in parallel with both the transmitter and the receiver; therefore, two circuit paths exist as shown by the solid arrows. Towards the transmitter the repeater current opposes the transmitter current because it goes in the opposite direction. This reduces the echo effect of the series repeater. On the other hand, the repeater current going to the receiver is in the same direction as the transmitter current; therefore, the repeater aids the transmitter and boosts the voice to the receiver. Coils are part of the series repeater.**

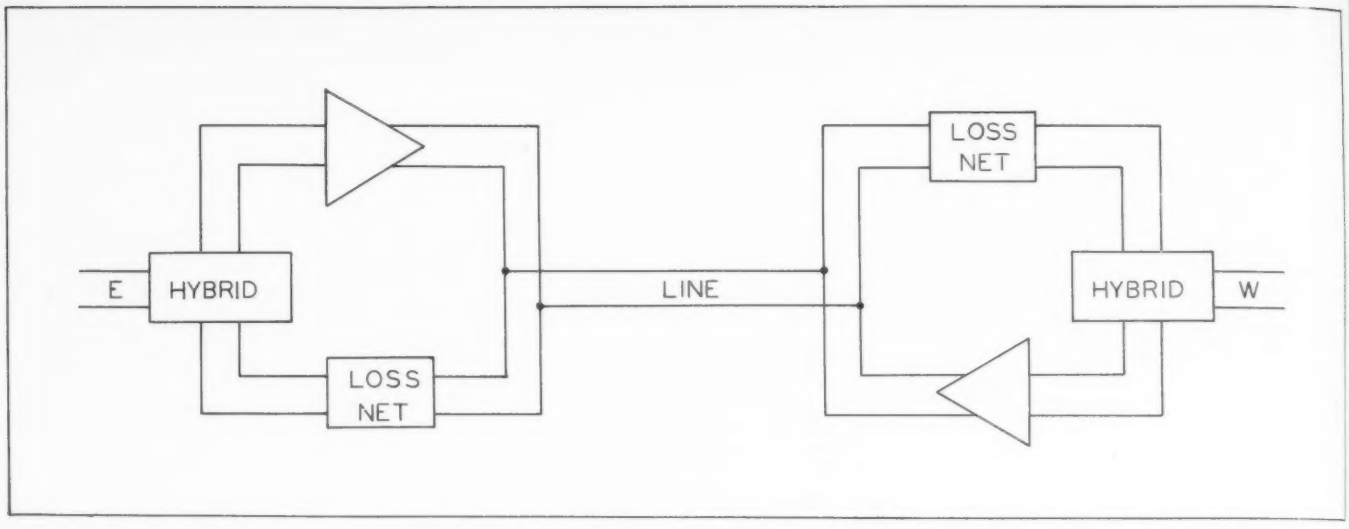



**Fig. 6.3. This repeater uses a one-way amplifier at each end of the line instead of both amplifiers at the middle of the circuit. Each voice is strongly amplified to overcome line noise which might be present, then cut down to a usable level by the loss network at the opposite end of the circuit.— From a Lynch Carrier Systems, Inc., drawing.**

repeater is not lost by the addition of the shunt repeater to the circuit.

The combination of the two repeaters eliminate the major shortcomings of either one alone and make possible a higher amplification. This advantage will probably extend the use of this low-cost apparatus to toll-connecting and tandem circuits which was not possible with the series repeater alone.

### *Repeater Applications*

One of the important factors which determine how well a person can hear on the telephone, is the amount of noise on the line. In other words, it is not so much how loud the distant person's voice sounds; it is how loud it is compared to the noise on the line (and in the room, too).

This is called the signal to noise ratio. In order to obtain a good ratio, one or both of the factors must be changed. That is, to hear better, one must raise the signal (voice) or lower the noise.

When a repeater is used to amplify the voice on the line, it can also amplify the noise on the line. If the reason for poor transmission is the noise, then amplification does no good. This is the same as trying to listen to a distant radio station through the noise. Turning up the volume control does not help matters any, because the noise gets louder, too.

Therefore, if an amplifier was put at one end of a noisy line, no improvement would result. Theoretically, a two-way repeater might do the most good, from a transmission standpoint, if placed at about the middle of the line. This, of course, is not always possible, but other solutions to the problem exist. Of course, if noise is not the problem, negative impedance repeaters like those described previously may be placed at each end of the circuit, with satisfactory results.

For lines with bad exposure to power or other noise, another method is shown in *Fig. 6.3*. In this drawing, the triangles represent one-way amplifiers, which amplify in the direction in which the triangle points. This repeater is another low-cost device of relatively simple design which works very well in circuits which can use it.

This repeater operates on the principle of amplifying the voice before it goes out onto the line where the noise exists. Thus, the speech is amplified, but not the noise. However, this principle requires that two one-way repeaters be used rather than one two-way device. Thus, there is a separate amplifier at each end of the line.

In *Fig. 6.3*, when speech originates at the E end of the line it is routed by the hybrid coil through the amplifier and out on the line. At the W end the voice currents enter the loss network. (They can't enter the amplifier at this point because it is pointed the wrong way.) The loss network is used to reduce the volume of the incoming voice down to a satisfactory point. This also reduces the line noise, which was not amplified, down to a point where it is not objectionable.

The hybrid coil accepts this reduced signal and sends it on to the listener at the W end. When the W end speaks, the same thing occurs as described above, but in the opposite direction.

### *Trouble Shooting*

Because it has no moving parts, a repeater is not subject to a great deal of trouble. The principal trouble with the repeater itself is the matter of tube aging or burnout. This can be readily determined by the use of a test receiver. That is, a signal can be sent into the repeater and a listening test made to see if the signal is coming out of it. Some repeaters have an additional winding in the hybrid coil for connection to a monitoring receiver.

Other repeaters require the use of a high impedance earphone (crystal). This is because anything which changes the resistance or impedance of a line connected to a repeater may set the thing to singing. A test receiver or other probe may upset the fine balance and cause feed-back. This makes testing difficult if special provisions are not made for monitoring.

However, a little thought sometimes helps a lot. For instance, in two-way repeaters other than the negative impedance type, a separate tube is used to amplify in each direction. Thus, if transmission fails in one direction only, it is a sign that one of the two amplifiers is out of order. A tube can always be changed on a trial basis if it is suspected, but make sure the new tube is known to be good (sometimes they are not).

With negative impedance repeaters, the circuit does not completely fail if a tube burns out. All that happens is that amplification stops, and the circuit will continue to operate on lower volume. (A special by-pass circuit on some other types of repeaters routes the voice around the repeater if the power fails.)

Perhaps the most frequent trouble with repeaters is not that they go completely dead, but rather that they commence to sing. If the circuit was in working order once, singing almost always indicates that line trouble has occurred. In fact, the outside line is

probably the weakest link in any telephone plant and should always be suspected first.

Because of the close balance required between the line and the repeater network, any change in the electrical constants of the line can cause singing. Even the addition of another ringing bridge, or two receivers being off at once may cause trouble.

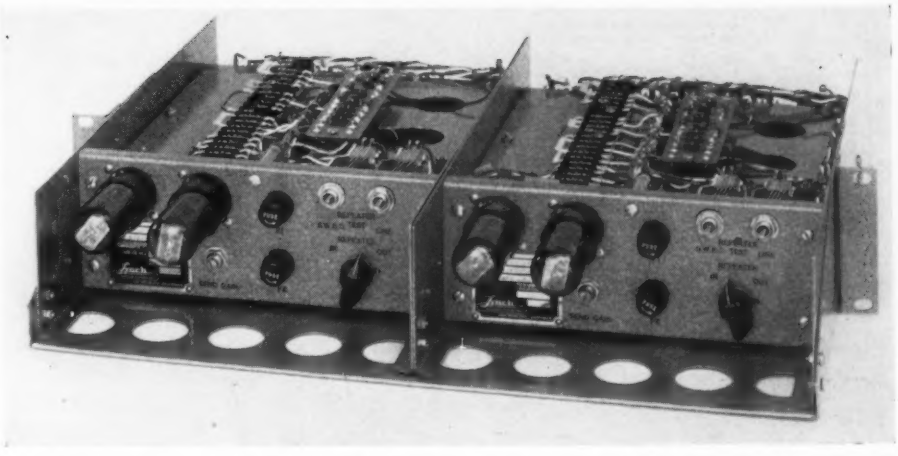
Therefore, the line should always be tested first in case of trouble on a repeatered circuit. If no line trouble is found, and singing continues, rebalance of the network may be indicated. This points up the necessity for balancing repeaters correctly when they are first connected. If a repeater transmits in one direction and not in the other, and changing a tube does not fix it, other repeater circuit trouble may be indicated.

The internal parts may be tested by checking voltages. A volt-ohm-milliameter of the type used by radio men is useful for this. Voltages at different tube socket points, as well as at resistors and condensers, can be compared with voltages shown on the manufacturers print, or with the voltages on a good circuit. This method will quickly disclose defective components.

### *Test Equipment*

In addition to test boxes, such as the trial network device described earlier in this series, test sets may be used which, in addition to a network, also introduce a signal into a repeater and measure it as it comes out.

In the negative impedance repeater, for instance, some types have small resistors of low value in series with the input and output. A specially designed test set can bridge across these resistors and inject a signal into the input, which is then effectively in series with the line on the input side. The outgoing signal can be measured as a voltage drop across the resistors in the output. In this manner, by comparing the signal put in with the signal coming out, the actual amplification or gain of the repeater can be determined. By using a variable oscillator as a signal source, this test can be made at different frequencies as an aid in adjusting the network. Beyond such special test sets and a volt-ohm-milliameter, and a high impedance receiver if required, no other test equipment is ordinarily needed, although a tube tester may be of use if the installation is large enough to warrant it.



**This pair of repeaters is of the type used at the end of lines exposed to power interference. One amplifier is used for each direction of transmission, and is located at the sending end for each direction.—Photo courtesy, Lynch Carrier Systems, Inc.**

* * * *

The writer wishes to express his thanks and appreciation to the following persons who supplied the drawings, photographs and technical material which made this series of articles possible:

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H. E. Marrows of Western Electric Co.

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Acknowledgment is also made of the assistance rendered by Sam French, plant staff assistant of Pacific Telephone & Telegraph Co., in checking the final manuscript and offering valuable advice on its preparation.

### *References*

The principal references consulted for the repeaters discussed in the first part of this series were the data supplied by the manufacturers of the equipment.

For the negative impedance equipment the following sources were used:

G. Crisson—"Negative Impedance and the Twin 21-type repeater," *Bell System Technical Journal*, July, 1931.

J. L. Merrill Jr.—"Theory of the Negative Impedance Converter," *Bell System Technical Journal*, January, 1951.

J. L. Merrill Jr., A. F. Rose and J. O. Smethurst — "Negative Impedance Telephone Repeaters," *Bell System Technical Journal*, September, 1954.

J. O. Smethurst—"E-Type Telephone Repeaters — Description, Equipment and Testing," *Communications and Electronics* (AIEE), November, 1954.

J. L. Merrill Jr., J. O. Smethurst and A. F. Rose—"Repeater Amplifies in Either Line Direction," *Electronics*, January, 1955.

A more complete explanation of the operation of vacuum tubes, condensers, coils, and other circuit components was contained in the author's series of articles on "Electrical Principles Used in Carrier Systems," which appeared in July, August, and September, 1954, issues of TELEPHONY. These articles are available in reprint from the publishers of this magazine.

[EDITOR'S NOTE: *This is the final article of the series on "Voice Frequency Repeaters." In the three succeeding issues will be published Mr. McKay's articles on "Power Supplies For Repeaters and Carriers."*]

**"Because we are committed to a competitive economy, we have maintained, for industry, the freedom to produce new and improved products as supplements or replacements for older goods or services. Industry long ago learned that if it was to remain free, it must compete, and the strength and productivity of our factories and our fields have resulted from the exercise of this freedom."—ARTHUR H. MOTLEY, *president, Parade Publication, Inc.***

# Courts and Commissions

## Three Minnesota Companies Authorized to Raise Rates

Three rate increases—for the Alexandria Telephone Co., the Carlos Telephone Co. and the Farmers Mutual Telephone Co., Cerro Gordo—were approved on Sept. 16 by the Minnesota Railroad & Warehouse Commission.

The Alexandria company's schedules of raised rates apply in its Alexandria, Nelson and Villard exchanges. Alexandria is presently a manual exchange, but is to be converted to automatic operation by about Oct. 29. At present the Alexandria company furnishes dial service in Nelson, Villard and a satellite of the Alexandria exchange called the Lake exchange. Extended area service is furnished between Alexandria, Lake and Nelson exchanges, the commission stated. Upon conversion of the Alexandria exchange, the company's investment per station will be about $224, according to the commission.

Operating revenues for the Alexandria company are expected to rise from $217,782 to $234,577 under the new rates, and net income from $35,307 to $52,130, a 5.79 per cent return on plant original cost (after conversion of Alexandria to automatic operation) of $900,000. The company serves 3,381 local, 601 rural, and 43 service stations.

Carlos Telephone Co.'s new rates, applying to its proposed Holmes City exchange as well as to its Carlos exchange, were calculated to increase operating revenues from $9,566 to $14,619, and net income from $1,853 to $3,353. Present plant original cost is $64,300. This figure will reach $92,500 following establishment of the new automatic exchange at Holmes City. Net income will be a 3.62 per cent return on this plant value.

An REA loan of $37,000 to be used to build the new Holmes City plant was made contingent upon approval of the proposed rates.

The Carlos company now serves approximately 89 urban and 138 rural stations; and there will be 26 urban and 57 rural stations at the proposed Holmes City exchange.

Rate increase authority for the Farmers Mutual company's Cerro Gordo and Bellingham exchanges (after conversion of Bellingham to automatic) was expected to bring in new operating revenues of $48,023 (up from $26,736) and increase net income to $11,369 from $325. Original cost of Farmers Mutual's plant after the Bellingham conversion will be $430,500, and the new net income will represent a 2.64 per cent return on it.

The Farmers Mutual company has applied to REA for a loan of $237,000 to be used to construct an automatic system in Bellingham, and the release of funds was contingent upon the approval of the dial service rates applied for. The Bellingham exchange now serves 220 subscribers. It is estimated by the company that the new Bellingham system will serve 466 subscribers and the average investment per station will be about $594.

Following are the old rates and the approved net automatic rates:

| | *Old Manual Bellingham* | *Old Automatic Cerro Gordo** | *Approved Automatic* |
|---|---|---|---|
| One-party business | $4.00(a) | $6.00 | $7.50 |
| Two-party business | 3.50(a) | — | 6.75 |
| Rural multi-party business | 3.25(b) | 5.00 | 6.00 |
| One-party residence | 2.75(a) | 4.50 | 5.00 |
| Two-party residence | — | 4.00 | 4.25 |
| Four-party residence | 2.25(a) | 3.50 | 3.75 |
| Rural multi-party | 2.75(b) | 4.50 | 4.50 |
| Mileage charge for service beyond the local base rate area, each ⅛ mile or fraction thereof: | | | |
| One-party | — | .30 | .30 |
| Two-party, each subscriber | — | .20 | .20 |
| Four-party, each subscriber | — | .15 | .15 |

Bellingham exchange (until conversion to automatic operation):
(a) All local rates to be billed monthly in advance and a discount of 25 cents to be allowed on gross rates if paid on or before the 15th day of the month in which service is rendered.
(b) Rural rates to be billed quarterly in advance and a discount of 75 cents to be allowed if paid by the 15th day of the first month of the quarter in which service is rendered.
* Net rates.

Farmers Mutual's two exchanges now serve 94 urban and 394 rural stations. When automatic service is available at Bellingham, the company expects the new totals to be 143 urban and 591 rural stations.

## Asks Increase in Illinois

The El Paso Telephone Co. on Sept. 29 requested a $12,000 annual rate increase for its 1,070 subscribers, the Illinois Commerce Commission has reported.

## Kansas Commission Hears Application to Purchase

The Kansas Corporation Commission on Sept. 26 heard an application from Elmer Garner of Piedmont to sell the Piedmont Telephone Co., to Leon Shepard.

The exchange serves 67 subscribers, commission officials noted.

## Injunction Granted Barring Covers on Directories

A temporary injunction restraining an advertising company and a plastics company from putting plastic advertising covers on telephone directories was issued on Oct. 6 by Circuit Judge William R. Dusher of Rockford, Ill., sitting in Lake County Circuit court in Waukegan, Ill.

The injunction was obtained by the Illinois Bell Telephone Co. and Armen N. Baragian, president of a Chicago rug cleaning company. Named defendants are Willard F. Miner, owner of Willard Miner Co., advertisers, and Leslie G. Hayden, owner of the Woodstock Plastics Co.

Illinois Bell charged that the covers were an unlawful trespassing on the company's telephone books.

In addition, it charged they were an annoyance and also gave the wrong number for the Northbrook, Ill., police department. The wrong number, when dialed, resulted in the caller reaching the rug company.

The covers have been distributed in 11 communities.

## Five Minnesota Independents To Increase Rates

Minnesota Railroad & Warehouse Commission on Oct. 3 authorized rate increases for five Independents—the Ashby Telephone Co.; Lake Park Telephone Co.; the Frazee exchange of the Lake Region Telephone Co., Pelican Rapids; Nevis Telephone Co., and the Rothsay Telephone Co.

Operating figures for the five companies before and after the rate increases are:

| | *Ashby Telephone Co.* | *Lake Park Telephone Co.* | *Frazee Exchange†* | *Nevis Telephone Co.* | *Rothsay Telephone Co.* |
|---|---|---|---|---|---|
| *Operating Revenues:* | | | | | |
| (1) Before: | $5,058 | $13,334 | $11,811 | $ 6,202 | $ 7,944 |
| (2) After: | 8,049 | 17,496 | 14,558 | 8,735 | 10,663 |
| *Net Income:* | | | | | |
| (1) Before: | $ 300* | $ 60 | $ 693 | $ 1,088* | $ 1,216* |
| (2) After: | 89 | 1,653 | 2,668 | 450 | 912 |
| *Recorded Book Cost of Plant:* | $7,200 | $40,000 | $49,000 | $17,000 | $21,000 |
| *Ratio of Net Income to Plant Cost:* | 1.24% | 4.13% | 5.44% | 2.65% | 4.34% |
| *Stations:* | | | | | |
| (1) Urban | 106 | 210 | 265 | 116 | 97 |
| (2) Rural | — | 274 | 65 | 7 | 149 |
| (3) Switched | 219 | — | 127 | 107 | 74 |

*Deficit
†Dial service

## Two Pennsylvania Companies Get Paystation Raises

Carbon Telephone Co., Lansford, Pa., increased its public paystation charge from five to 10 cents on Oct. 2 (TELEPHONY, Sept. 3, p. 40).

The Pennsylvania Public Utility Commission on Sept. 20 concluded that the raise should not be suspended after making a study of the company's supporting data.

The paystation rate of the North Pittsburgh Telephone Co., Gibsonia, also increased from five to 10 cents on Oct. 2.

The Commission decided on Sept. 20 not to suspend the increase after hearing supporting data from the company. Company officials estimate the increase will bring $1,695 in additional annual revenue.

North Pittsburgh said it planned to put the increase into effect at the same time it cuts over three exchanges to new and larger automatic systems.

## Grant Rate Raise of $7,087 To Wisconsin Independent

The Wisconsin Public Service Commission on Sept. 27 authorized the Elroy Telephone Co. to increase rates $7,087 a year (TELEPHONY, Sept. 17, p. 39).

The company, which serves 800 city and rural subscribers, had sought a $9,106 increase.

The commission's order stated that the increase would permit the company to earn net operating revenues of $3,750 a year, a return of 6.5 per cent on its investment.

## Gains Higher Rates After Cut-Over in Texas

United Telephone Co., Llano, Tex., has been authorized to increase rates at its Marble Falls exchange when conversion to automatic is completed some time in January, 1956, it was reported on Sept. 22.

Urban rates include one-party business, $8.00; one-party residence, $4.75; two-party residence, $4.00, and four-party residence, $3.25.

Rural rates include subscribers within 5 miles of the city limits, $3.50; 5 to 8 miles, $3.75; 8 to 11, $4.00, and 11 to 14, $4.25.

## Authorizes Minnesota Company Rate Raise

East Otter Tail Telephone Co., Perham, on Oct. 3 secured rate raises from the Minnesota Railroad & Warehouse Commission which are estimated to increase operating revenues from the present $98,293 to $133,870.

The commission noted that the company has converted its Dent, Otter Tail and Perham exchanges to automatic operation and has dial service rates in effect. The new approved rates will be effective at those three exchanges and at the company's New York Mills exchange upon completion of the cut-over to automatic. Then net income for the company's over-all operations will rise from $16,909 to $37,527, and the return will be 4.04 per cent on a net book cost of plant of $928,733.

Existing rates for dial service and those approved by the commission are:

| | *Old** | *Perham†* | *New York Mills†* | *Dent and Otter Tail†* |
|---|---|---|---|---|
| One-party business | $7.00 | $8.00 | $7.50 | $7.25 |
| Two-Party business | 6.00 | 7.00 | 6.50 | 6.25 |
| Rural 10-party business | 5.50 | 6.50 | 6.00 | 5.75 |
| Combined business and residence | 11.25 | 12.25 | 11.50 | 11.25 |
| One-party residence | 4.50 | 5.25 | 5.00 | 5.00 |
| Four-party residence | 3.75 | 4.25 | 4.00 | 4.00 |
| Rural 10-party residence | 3.75 | 4.25 | 4.25 | 4.25 |

*All rates to be billed monthly in advance and a discount of 25 cents per month is to be allowed on all gross rates if paid on or before the 10th day of the month in which service is rendered.

†Approved rates to be billed monthly in advance at the *net* rate.

The East Otter Tail company serves 2,225 urban and 1,038 rural stations.

## Gains Increase in Oregon To Relieve Deficit

Added gross revenues of $11,909.17 yearly were approved on Sept. 23 for the Estacada Telephone & Telegraph Co. by the Oregon Public Utilities Commissioner.

The company had asked for rate increases providing $17,461.60, annually, but the commissioner found that the $11,909.17 authorized would result in a rate of return of 6 per cent on an adjusted assumed rate base of $35,815.-94 (the company's net fixed capital). In 1954 the Estacada company had a net operating deficit of $1,934.18.

## New Co-op Incorporated In North Dakota

Incorporation papers were filed the second week in September by the North University Avenue Telephone Co. of Vermillion, N. D.

The new co-op will operate 8½ miles of line on a cooperative basis. Thirty-three telephones will be served by the new line.

Fern Osmanson is secretary-treasurer of the corporation. The company was capitalized at $1,800.

# Bell's New Silicon Power Rectifier

# Promises Economy, Many Uses

A TINY NEW power rectifier made of extremely pure silicon may reduce costs in many industries using electric power, Bell Telephone Laboratories announced recently.

The simple electronic device converts alternating into direct current, an essential step in the operation of telephone systems. The new device will also be useful in industries and homes which depend upon rectifiers to convert current for such purposes as machinery and operating television sets. It is not economically feasible to generate and transmit direct current.

In spite of the general trend toward smaller and more efficient equipment, power rectifiers have remained large, limited in efficiency and in need of bulky cooling equipment to prevent overheating.

Bell scientists believe that the new rectifier will far surpass any yet made of silicon or other material. They expect it may have an almost unlimited life span, and will be capable of operating continuously at temperatures up to 400 degrees F.

These advantages are expected to open up many new uses in telecommunication, heavy industry and in military applications. The rectifier's efficiency—more than 98 per cent of the theoretical limit—was made possible by recent work of M. B. Prince, a Bell Laboratories physicist.

Two of the new rectifiers, when made about the size of peas, linked together, and mounted on a cooling fin, will furnish more than 20 amperes of direct current at 100 volts. This amounts to 2,000 watts—with only 20 watts lost through heat.

Only one ampere or less is needed to run a radio or television set, or to operate a group of telephone switching relays. To charge storage batteries used in automobiles and telephone central offices or to operate electric motors, from 10 to more than 100 amperes may be needed.

Highly purified silicon is a costly material when bought in pound quantities, but such minute amounts are used in the new rectifier that the material becomes relatively inexpensive to use. A rectifier the size of a pea, for example, contains a silicon wafer only .005 inch thick and $\frac{1}{10}$ of an inch square.

Even smaller rectifiers have been made and will be desirable for use in the telephone system and in electronic computers.

Larger rectifiers are necessary for other uses where greater amounts of power must be handled. The size of the wafer would vary, just as the size of a copper wire ranges from thin to heavy, depending upon the current that must be carried.

The new silicon rectifiers provide 5,000 times more current than conventional rectifiers of the same size, thus permitting miniature operating units. Even so, the newest techniques may be applied to large sizes and thereby provide entirely new current and power possibilities for industry. On a machine the size of a locomotive, for example, significant amounts of space may be saved by the new rectifiers.

The silicon power rectifier grew out of the same broad research program at Bell Laboratories which produced the transistor—a tiny, long-lived amplifying device—and the Bell solar battery—first device to convert sunlight into substantial amounts of electricity.

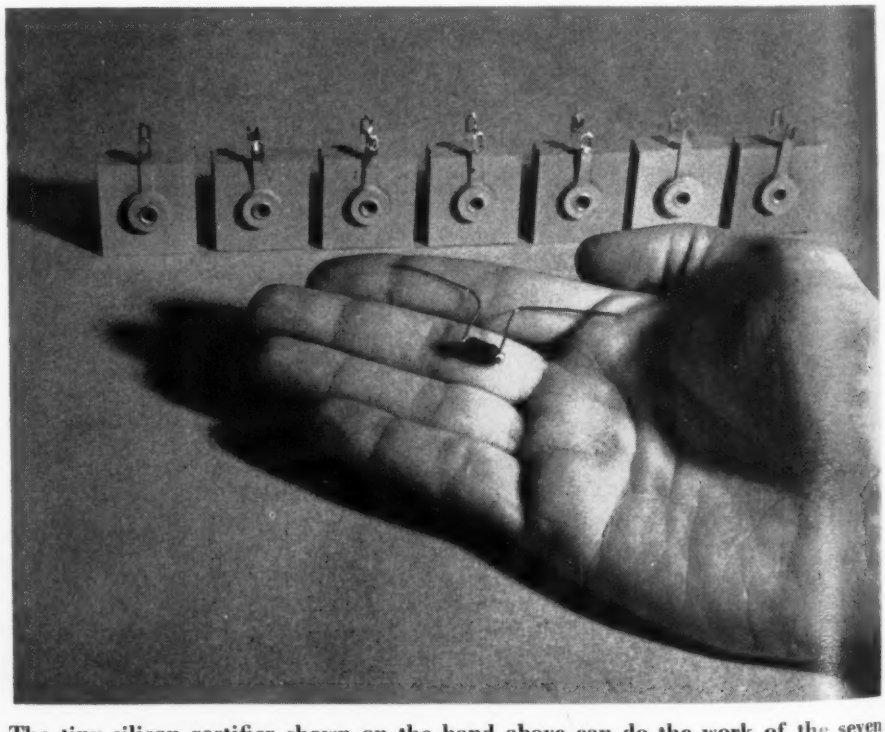
The techniques created at the laboratories for producing this silicon device involve the controlled introduction of impurity elements into the layers near the surface of a thin slice of silicon.

Treatment with vapors at high temperatures causes a minute trace of the impurities to enter the crystalline structure of the silicon. Before this process begins the silicon must first be so pure that there is less than one impurity atom per billion silicon atoms.

The controlled introduction of impurity atoms forms in the silicon a p-n (positive-negative) junction, which is the heart of the transistor. C. S. Fuller and G. L. Pearson, of Bell Telephone Laboratories, announced the application of the techniques to power rectifiers more than a year ago.

Development of these techniques as applied to a wide variety of silicon devices is being intensively pursued by K. D. Smith, C. J. Frosch and their associates.

Production plans for the new silicon power rectifier are being worked out with the Western Electric Co. Production will start soon for both Bell System and military uses.



**The tiny silicon rectifier shown on the hand above can do the work of the seven others in the background, which are selenium rectifiers such as might ordinarily be used in a private telephone switchboard or a television set. Bell's new device operates at higher temperatures, and is expected to have an extremely long life. The active element in it is a silicon wafer smaller than the head of a pin.**

# "COMPANDORS brought our lines up to toll quality . . .

# . . . just like finding a new circuit!"

If you have a problem with circuits below commercial standard because of noise or crosstalk—chances are that Compandors can solve it. On carrier or radio channels, Compandors will improve signal-to-noise ratio as much as 22 db—*without* retransposing, and at a *fraction* of retransposition costs!

**NOISE** from power line induction or random pickup can be reduced to a negligible factor. Moreover, in making noisy, marginal circuits commercially usable, much of the costly maintenance now required is eliminated.

**CROSSTALK** between carrier telephone systems on lines transposed for lower frequencies can be substantially reduced; Compandors thus open up new possibilities for additional carrier circuits on present lines—without the necessity for retransposing! For example, you may be able to use more than three carrier systems like Lenkurt Type 33A on lines transposed for voice frequencies; or you may be able to use three or more systems like Lenkurt Type 45A on lines transposed for low-frequency carrier systems.

Users have found that Compandors can be put to work for a surprisingly low cost. We think you'll agree that this saving is worth investigating. Ask for further details in Bulletin 5090-B. Write to Automatic Electric Sales Corporation, 1033 W. Van Buren St., Chicago 7, Ill. In Canada, Automatic Electric Sales (Canada) Ltd., Toronto. *Offices in principal cities.*

**Type 5090-B Lenkurt COMPANDOR**

**Flexibility** — Built-in strapping terminals permit operation at —16 and +7DBM, —13 and +4DBM or —4 and +4DBM. No internal adjustment needed.

**Miniature size** — Mounts on standard rack. Total depth, 10 inches. 4-unit shelf occupies 3½ inches vertical space. Plug-in assembly.

**Versatility** — Can be used with any carrier system or radio channel. Adaptable to filament voltages of 6.3, 12.6, 24 and 48 volts.

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AUTOMATIC ELECTRIC — A GREAT NAME IN COMMUNICATIONS — LENKURT

# MODERN TELEPHONE MANAGEMENT

*Concluded from page 19*

and how effectively does it produce an acceptable product?

In measuring the effectiveness of the program of executive development, the first thing to be sure about is that your program is affecting the basic thinking of all participants along the following lines:

(1) It is developing their thinking toward the recognition of business as a fundamentally sound and right force in the economic and social structure of our country, providing needed jobs, needed income to investors, needed work for its suppliers and needed service for its customers.

(2) It is developing their thinking toward the recognition of the true role of the executive as a man who is always responsible and always concerned with being right.

(3) It is developing their thinking toward the recognition that the strongest decisions are always based, not on what is the easiest or most pleasant thing to do, but rather on a carefully reasoned out conclusion as to what is of the greatest good for the greatest number.

(4) It is developing their thinking toward the long range view of all things so that there be full recognition that settlement of a problem today will create additional problems tomorrow.

(5) It is developing their thinking away from playing favorites and toward recognition of merit as the sole basis for progress of any kind.

(6) It is developing their thinking toward a realization that their personal progress depends on progress of the business which will carry them along with it.

Second to contributing to the basic thinking of a man along the lines I have just enumerated, it seems to me that your program of executive development should also better his intuitive "feel" for managing.

He should be made to feel that people should do things because they are right for the business. His job is to develop and interpret the facts so that they can tell him what must be done.

He should be made to feel that the effort of communicating properly with his people is bound to pay off through the elimination of a great number of misunderstandings and false starts which will otherwise plague him in his managing efforts and hamstring his people in their efforts to carry the business forward.

He should be made to feel that the advancement of people to important posts in association with him is a matter of the utmost importance, that moving a man beyond his ability is frequently a hardship to that man and a real blow to the company's progress.

He should be made to feel that it is essential for him to be able to visualize and utilize fully the "staff concept." No one man can carry today all of the specialized knowledges so essential to the success of a company or business.

### *Measuring the People*

How do we go about measuring the people in our program of executive development in relation to these things I have mentioned as being important?

Frankly, I don't know the whole answer and I don't think anyone does, really.

I think their success in running that segment of the business which has been assigned to them to run, no matter how small, is part of the answer.

I think their readily recognized driving urge to help others in management at comparable level with their own level, and to do so tactfully, is another.

Most of all, I think that the urge to accept challenge and to do so cheerfully with confidence of success in every move is the most effective answer of all. The well-rounded man we are looking for, you see, will be that kind of a man.

I have talked with you all too briefly, about executive development. It is a very complex subject—not too readily adaptable to being brushed over as this short speech must do.

Executive development in any business calls for action, not speeches. I have served you well if I have caused you to think about it; to think about it in terms of something which you will plan to do as a management program in your business.

I care not if you disagree with much that I have said. I care a great deal if you disagree with me that it is not worth thinking about and planning for in your own way in your own company.

In conclusion I say to you that all executives are optimists. They must be optimists to physically and mentally survive the pressures under which they operate from day to day.

You will need your optimism in guiding your program of executive development.

# IN THE NATION'S CAPITAL

*Concluded from page 21*

of centuries ago. On Oct. 5, at Fort Monmouth, N. J., the Army Signal Corps of Engineers gave a laboratory demonstration of a device whereby the human voice could power a point-to-point radio communication with no other source of energy than its own sound waves. This radio demonstrator, small enough to fit inside of a telephone mouth piece, works only as long as the sender speaks. The energy of his voice literally activates the broadcast which does not need any added power from batteries or other sources.

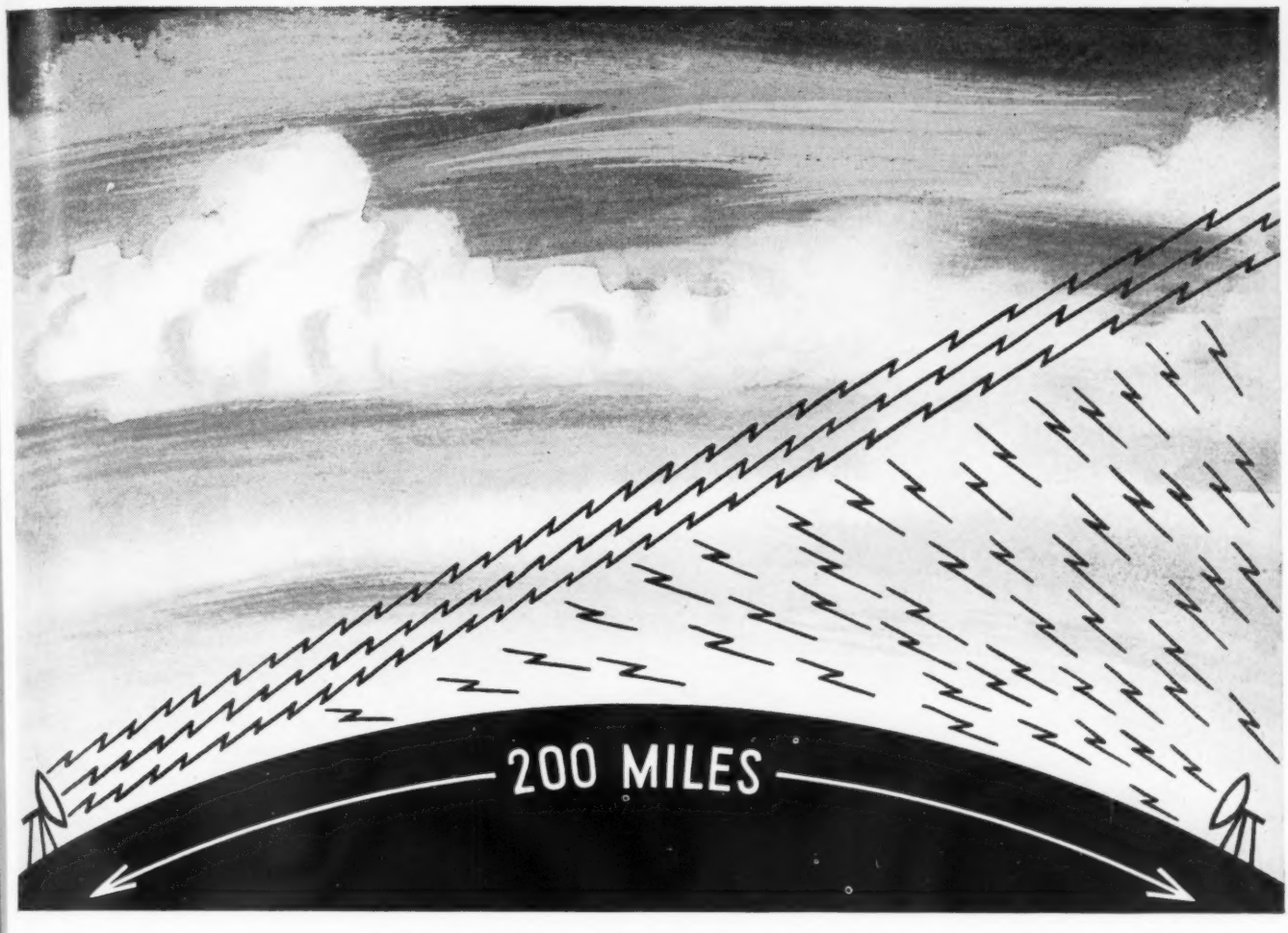
As for "talking on sunbeams," the American Telephone & Telegraph Co. demonstrated that only a week before on a rural telephone line at Americus, Ga., using its new silicon-transmitter, a mirror-shaped device on top of a telephone pole, captured energy of sunlight so as to activate a telephone conversation. This test further showed that this system of telephone communication could even be continued during nighttime and shady hours by virtue of sunlight energy stored in the Bell laboratory's new "solar battery." This correspondent recently saw a very interesting demonstration of the solar battery as part of the splendid Bell System's exhibit in Washington, D. C.

While both of these things are still in the experimental stage, they suggest possibilities which may eventually be of as much economic importance to small far-flung Independent telephone companies, as to the well-established Bell System operations in densely populated areas.

Radio and telephone communication, without the need of local electrical supply, would seem to be a double miracle, made to order for rural telephony in some areas. It may be possible before long to see actual demonstrations of such a telephone system in parts of the country where electricity is not available for communications.

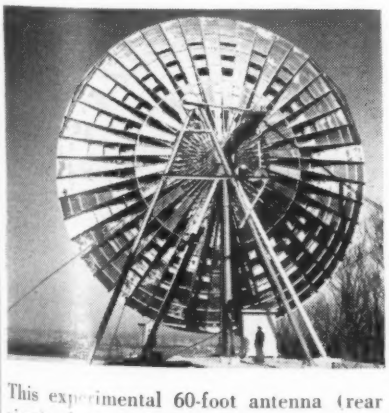
The fact that the reliability of existing telephone facilities might be backed up by simple auxiliary equipment, looking something like a small platform on top of a line pole, is something for the Independent telephone company owner to look forward to with interest.

Unfortunately, and in some respects like the fairy tale itself, such miracles of the laboratory take time, money, and organization before they can be reduced to commonplace utilization. No bank will lend money on a fairy tale, as such. But, programs of vision plus managerial resourcefulness will command even a banker's respect when the time is ripe. It might not be too optimistic a note for Independent telephone men to look at these future promises of service improvements and sing with his cowboy hero in "Oklahoma" that it looks like a beautiful morning and "everything's going my way."




Highly schematic drawing illustrates the possible distribution of energy in ultra-high-frequency "over-the-horizon" transmission. The effect is similar to that of a powerful searchlight whose beam points into the sky. Light can be seen miles away from behind a hill even when the searchlight lens is invisible.

# Something new on the telephone horizon



This experimental 60-foot antenna (rear view) photographed at Bell Laboratories in Holmdel, New Jersey, is designed for study of "over-the-horizon" phenomena.

Telephone conversations and television pictures can now travel by ultra-high-frequency radio waves far beyond the horizon. This was recently demonstrated by Bell Telephone Laboratories and Massachusetts Institute of Technology scientists using "over-the-horizon" wave propagation, an important recent development in the radio transmission field.

This technique makes possible 200-mile spans between stations, instead of the 30-mile spans used for present line-of-sight transmission. It opens the way to ultra-high frequencies across water or over rugged terrain, where relay stations would be difficult to build.

In standard microwave line-of-sight transmission, stations are so spaced that the main beam can be used. But now, with huge 60-foot antennas, and much higher power, some signals drop off this main beam as it shoots off into space. These signals reach distant points beyond the horizon after reflection or scattering by the atmosphere. The greater power and larger antennas of the "over-the-horizon" system permit recapture of some of these signals and make them useful carriers. The system will be a valuable supplement to existing radio relay links.

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- **25-year battery**
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The few dollars you spend on *reliable* equipment today will be repaid a hundredfold in lower maintenance costs for years to come. Protect your investment with the double guarantee offered by Stromberg-Carlson. First, leading manufacturers build this equipment, and guarantee it. Second, because we recommend and sell this equipment to the telephone industry, we *also* guarantee its performance!

### Like to know more about Telephone Cable?

Then get your free copy of the Kennecott Telephone Cable handbook. This book contains a concise description of the construction of Kennecott Telephone Cable, and Textile Insulated Cable for terminating and interphone use.

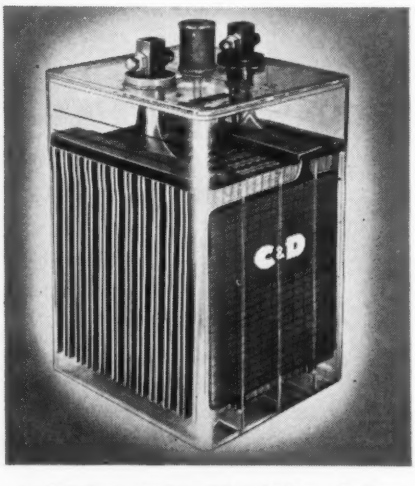
It also includes specifications for Paper Insulated, Dry (core) Lead Encased Telephone Cable, and tables showing lead thicknesses, approximate outside diameter, weights per thousand feet, and standard reel lengths.

Specify Kennecott — distributed by Stromberg-Carlson.

### Battery will still have its pep when 1980 rolls around

It will last 25 years—in full float service! That's the life expectancy of C & D's PlastiCal (lead-calcium grids) telephone battery.

You get this extra-long, trouble-free operation because C & D Batteries, Inc. use an exclusive suspended and supported plate construction.




In full float service, this telephone battery stays on the job a quarter of a century.

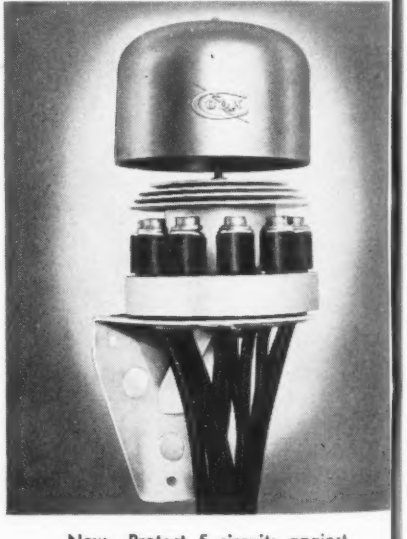
Illustrated here is a typical C & D telephone battery with a 660 A.H. capacity. When ordering this 25-year battery, specify PCE-660.

When you find that a 14-year expectancy meets your needs, you can get dependable operation from a C & D PlastiCell (high-tensile lead alloy grids) battery. For a PlastiCell with capacity of 660 A.H., specify CE-23.

You can order either of these C & D telephone batteries, plus other capacities, from your Stromberg-Carlson representative. Ask him about extra-long-life power supply with C & D Batteries.

### The new 5 circuit Hy-Cap Power Cross Protector

Whenever telephones are in joint occupancy with power lines, a heavy-duty protector should protect the telephone lines against destructive power cross.



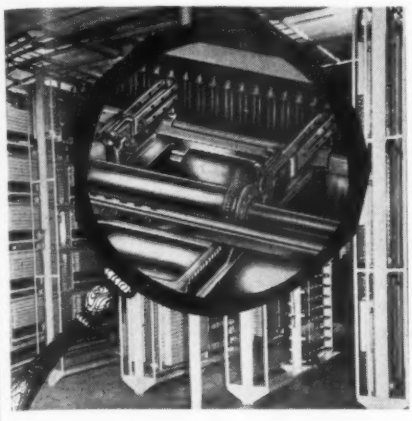
Now—Protect 5 circuits against power crosses with one protector.

Such protection can now be had when the Cook Electric Company's Hy-Cap 5 Pair Power Cross Protector is installed. This unit mounts on a type 10B cross-arm and will protect 10 lines. Connections are made with pre-cut No. 10 plastic insulated copper wires which terminate on rugged discharge carbons. There is just one ground wire for easier installation. The protector will break down at 3000 volts and will continue to ground the fault current as long as it exists.

A single pair Hy-Cap Power Cross Protector is also available.

**Housekeeping at a minimum**

Some day you'll cut over to dial service. When you do, you'll give



even greater consideration to maintenance—and maintenance revolves primarily around the factors of wear and **dirt.**

The XY® Dial System will reduce this problem to the absolute minimum. The twin-contact brushes, because of their **wiping** action, will last the life of the switch. And because the wire-bank multiples are **vertical,** dirt and foreign matter fall right through, instead of settling on the wires.

Big or small, the exchange with XY dial equipment is the most profitable because of its modest first cost and its low operating maintenance.

---

*Did you know* . . . that the Stromberg-Carlson general catalog includes 105 pages of maintenance and construction supplies alone? You can do *all* your business "under one roof" and find the same quality and reliability in every item.

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## General Cassevant Heads Signal Corps Division

Brigadier General Albert F. Cassevant has reported for duty as Chief of the Procurement and Distribution Division in the Office of the Chief Signal Officer. His previous assignment was Signal Officer of the United States Army Forces in the Far East.

General Cassevant served his first tour of duty in Washington in 1941 when he was assigned to the Materiel Division in the Office of the Chief of Coast Artillery. In 1942 he served there with the Antiaircraft Command and in 1943 with the Electronics Branch of the Army Ground Forces.

General Cassevant was detailed to the Signal Corps in November 1943, and was named director of the Evans Laboratory of the Signal Corps Engineering Laboratories at Fort Monmouth, N. J. Upon termination of his directorship in July, 1944, he became Chief, Engineering Division, and then assistant Commanding Officer of the Signal Corps Ground Signal Agency, Bradley Beach, N. J. He left this assignment in May, 1945, for temporary duty in the Asiatic-Pacific theater.

General Cassevant returned to the United States in July, 1945, to become assistant Commanding Officer of the Signal Corps Engineering Laboratories. In September, 1945, he embarked again for overseas duty, serving as Signal Officer, Base X and Chief Signal Officer, Army Forces Western Pacific in the Asiatic Pacific Theater until August, 1946. Upon his return to the United States, he was reassigned to the Signals Corps Engineering Laboratories where he served briefly as assistant Director of Engineering and then was named Director of Engineering at these laboratories in September, 1947. In October, 1947, he was transferred from the Coast Artillery Corps to the Signal Corps.

General Cassevant left his assignment at the Signal Corps Engineering Laboratories in January, 1948, to enter the Armed Forces Staff College, Norfolk, Va. He returned to Fort Monmouth in June, 1949, as director of the Evans Signal Corps Laboratory. Terminating this assignment in June 1950, he was assigned as a student at the National War College, Washington, D. C.

General Cassevant joined the staff of the Chief Signal Officer, Washington, D. C., in July, 1951, and was assigned to the Procurement and Distribution Division. He became the Assistant Chief of this division in November, 1951, serving in this capacity until June, 1954.

He is a native of Biddeford, Me., where he attended public schools. He entered the U. S. Army after graduation from the United States Military Academy in 1931.

## 1956 Microwave Symposium To Be Held in Philadelphia

The National Symposium on Microwave Techniques will be held in Philadelphia on Feb. 2, and 3, 1956, The Institute of Radio Engineers, New York 21, N. Y., has announced. It is sponsored jointly by the Professional Group on Antennas and Propagation, the Professional Group on Microwave Theory and Techniques, and Philadelphia Section of the Institute of Radio Engineers.

A well-balanced program is planned and high quality technical papers dealing with this field of interest are requested. The program tentatively planned for this symposium will include sessions on radiating systems; guided microwave transmission; measurements and propagation, and components.

## Obituaries

DONALD H. STOOPS, 58, former vice president and co-owner of the Nappanee (Ind.) Telephone Co., died on Sept. 14 of cerebral concussion which followed a fall down the basement stairs of his home. Mr. Stoops had been retired from the telephone business for about two years.

Mr. Stoops is survived by his wife; four children, Donald John of Bellingham, Wash.; Ward Robert, Brookline, Mass., David William and Judy Nell; two brothers, John T. of Chicago, and LaMar, manager of the Nappanee Telephone Co., and member of the board of directors of the Indiana Telephone Association, and a sister, Mrs. Dorothy Ambruster of Glendale, Wis.

*

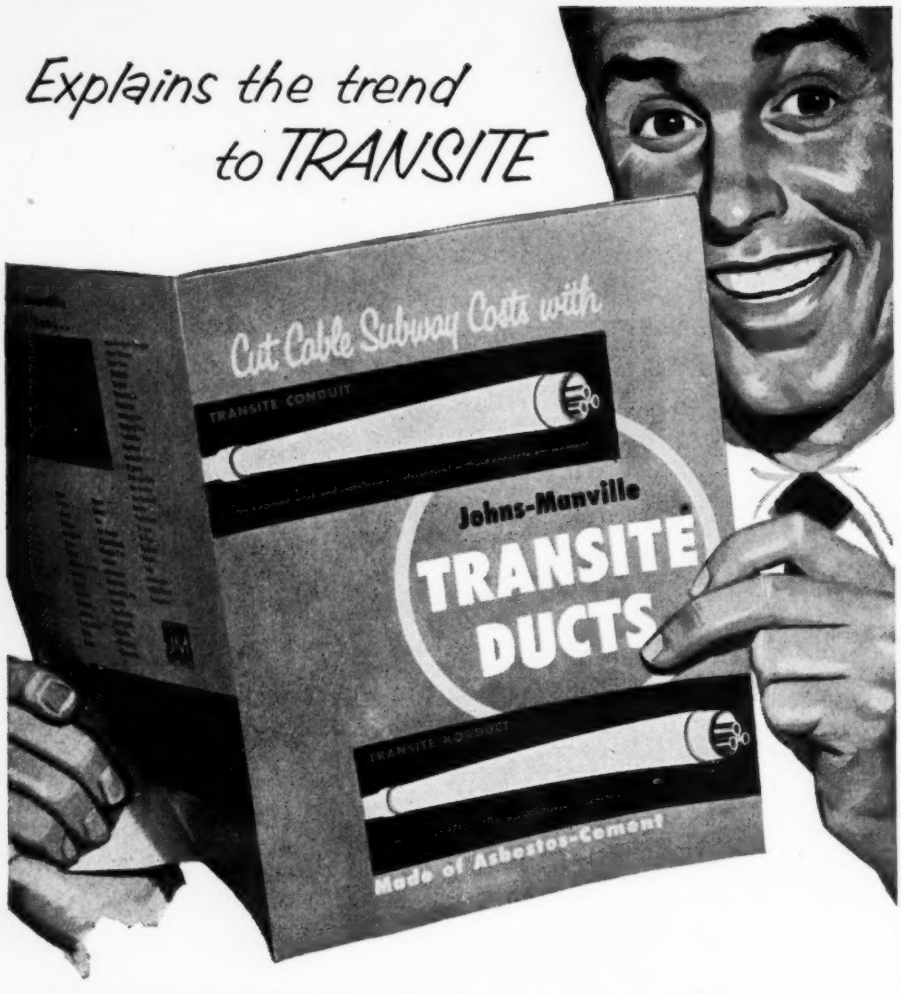
ROSS BYRON, president of the Midwest Telephone Co., Inc., Petersburg, Ind., died at his home in Chicago on Sept. 23.

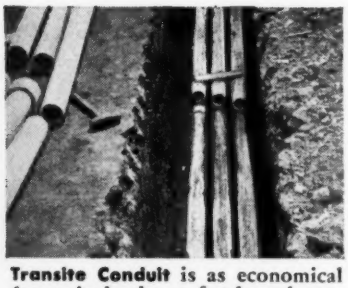
*

GEORGE FRANKLIN HANDWORK, 93, chairman of the board of directors of the Conestoga Telephone Co., Birdsboro, Pa., which he organized in 1909, died on Sept. 18 in Reading Hospital.

**"We cannot run our business successfully by blindly following the findings of public opinion polls. But in today's social and economic environment it would be hazardous indeed were we to fail to give due consideration to what the public thinks."—PAUL F. CLARK, *president, John Hancock Mutual Life Insurance Co.***

*Explains the trend to* TRANSITE



**Transite Conduit** is as economical for main banks as for lateral construction. It also saves maintenance.

**Unusually corrosive soil** required Transite Duct to replace another type in this telephone cable system.

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THIS EASILY READ BOOKLET tells why more and more telephone companies now use Transite® asbestos-cement ducts—an improved, permanent type of cable protection that costs less. The ducts, being inorganic and nonmetallic, cannot rust . . . are immune to electrolysis . . . resist soil corrosion. They withstand all normal stresses. Thus, maintenance is practically eliminated.

**Transite Ducts save installation costs.** The sections, being 10 feet long, mean fewer joints in the completed line. Lightweight, easily handled, they are readily assembled and disassembled.

In direct buried lines, the tight joint provided by Transite Conduit excludes water and silt from duct interior. This eliminates cleaning of ducts. Additional savings are realized by pneumatic rodding instead of the hand rodding that is necessary with less effective joints that, being less effective, permit leakage.

**Other features** of Transite Ducts are also covered in the new booklet, EL-29A. Write Johns-Manville, Box 60, New York 16, N. Y. In Canada, 565 Lakeshore Rd. E., Port Credit, Ontario.

**Johns-Manville TRANSITE DUCTS**


# REA APPROVES LOANS

*Continued from page 22*

W. E. G. Dial Telephone, Inc., Gardner, Kan., on Sept. 29 was allocated $334,000, its third REA loan.

With these funds the borrower plans to expand its service into a non-contiguous area of Osage County. As a center for the new service, W. E. G. Dial has purchased the Overbrook Telephone Co.'s common battery facilities. The borrower plans to improve service for the 408 Overbrook subscribers as well as for 86 subscribers who have their own lines in the nearby Michigan Valley area.

A new combined automatic exchange and commercial office building will be constructed at Overbrook. The commercial facilities in the building will serve as a branch office for the Overbrook exchange only. Of the existing line, 121 miles will be extensively rebuilt and used in the proposed addition.

The borrower also plans to add 64 miles of new line in the Overbrook area. These changes will make possible not only improved service for the existing subscribers but initial service for 81 farm homes and other rural establishments now without telephones.

REA loans to W. E. G. total $802,000 and will enable the company to furnish modern service to 2,163 rural subscribers in Franklin, Johnson and Osage counties. The system, when complete, will consist of 480 miles of line and four exchanges. The Edgerton, Gardner and Wellsville offices are in operation.

Ross Gault is president of the W. E. G. company.

*

Mid Century Telephone Cooperative, Canton, Ill., on Sept. 29 was authorized to borrow $145,000, its third REA loan. The cooperative plans to use these funds, as soon as conditions of the loan contract are met, to furnish new and improved telephone service to 347 rural subscribers in Knox and Fulton counties.

As a nucleus for the expanded service, the borrower proposes to acquire the facilities of the Gilson Mutual Switchboard Co. and the Ellisville Telephone Co. These companies are now serving 230 subscribers over 72 miles of line.

The Mid Century co-op plans to construct 37 miles of new line, rebuild 44 miles of the existing line and retire the remaining 28 miles. New automatic offices will replace the existing magneto facilities at Ellisville and Gilson.

REA loans to Mid Century to date

total $553,000. The cooperative plans to offer new and improved service to 1,224 rural subscribers in Fulton, Knox and McDonough counties.

The completed system will consist of 276 miles of line and five exchanges including the two in the Sept. 29 loan. The Table Grove and Marietta exchanges already are in operation, serving about 340 subscribers.

Sidney F. Smith is president and Clyde E. Eskridge is manager of the Mid Century cooperative.

## Commercial Test Given Solar Battery in Georgia

Bell Laboratories' solar battery made its commercial debut on Oct. 4 in Americus, Ga., and despite a murky sky it still produced about 0.4 watt, enough to power message-carrying facilities (TELEPHONY, July 23, p. 31).

The solar battery is composed of a thin slab of aluminum, plastic and glass, containing 432 silicon disks. The slab-like battery faces due south and slants 55 degrees from the perpendicular to catch the maximum amount of sunlight on the shortest day of the year, a Bell engineer stated. The battery is connected with storage batteries which save up surplus power to operate the telephones at night.

Bell Laboratories hopes the battery will prove practical for powering telephones in rural areas or other sections far removed from conventional sources of power.

Americus was selected for the solar battery experiment because its central switching equipment is typical of that found in rural areas. Also, the area will provide a good test of the ruggedness of the equipment, since it has frequent electrical storms and the lightning's voltage is increased by the electrical resistance of Georgia's red clay.

## Michigan Independent Cited

T. A. Saunders, president, Union Telephone Co., Owosso, Mich., received from Maj. Gen. George C. Moran, adjutant general of Michigan National Guard, a certificate of commendation on behalf of the company's assistance in the nationwide test alert of the National Guard held last April called "Operation Minuteman," it was reported on Oct. 7.

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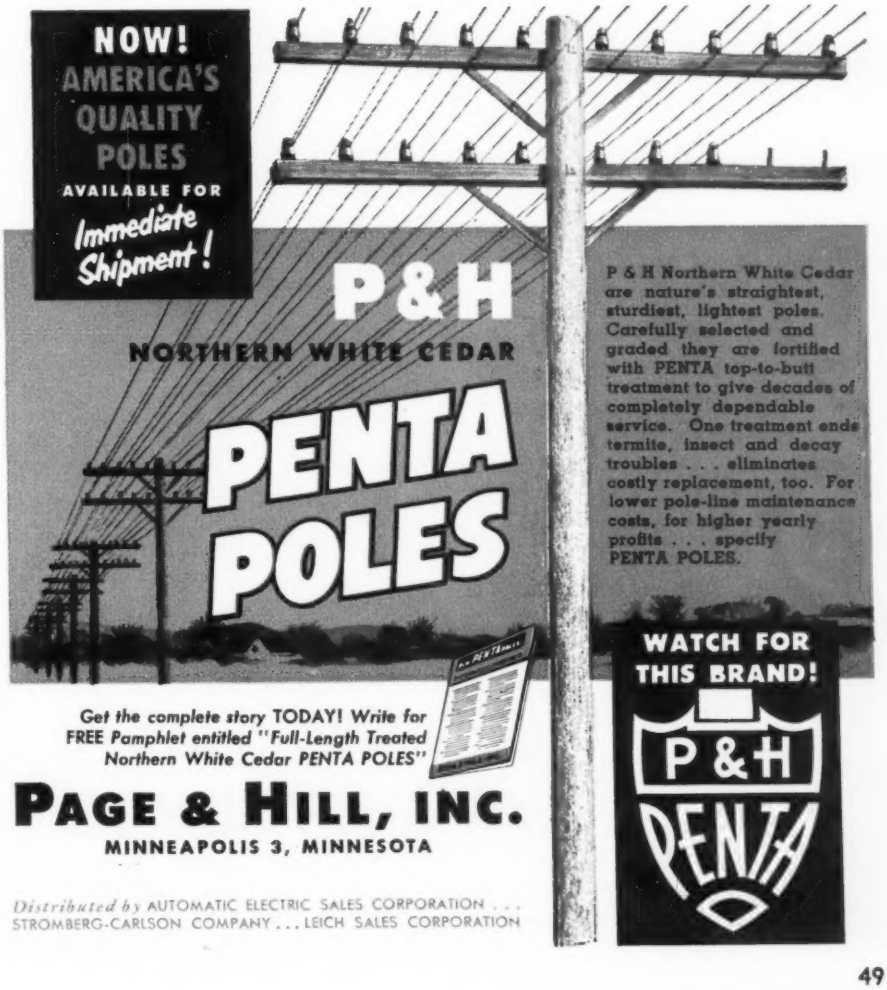

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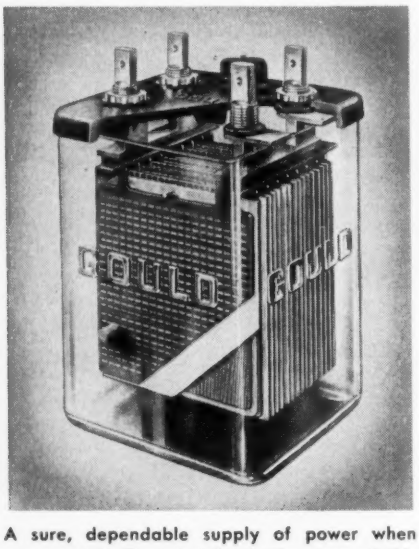


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# NEW DEVELOPMENTS

*Concluded from page 24*

considerable time and effort to the development and production of these special labor saving equipments. A few of these new features will be described briefly.

Any derrick and winch-equipped truck, large or small, can perform pole hole digging operations with the addition of a special pole hole digger. Equipped with this unit, your line crew can dig a hole and set a pole in less than five minutes. This pole hole digger reaches up on hills, down into ditches, or across obstacles. The auger

**Fig. 26. Tools for the two-man crew.**

which is available in 8 to 20-inch diameters is powered by the truck's engine—a separate power source is not needed. A telescoping drive shaft to the auger permits drilling 8-foot deep holes up to 20 feet behind the truck. The pole hole digger works equally well in trucks equipped with front-mounted derricks.

To dig a hole, the truck is driven to the site, the digger attached to the winch line, and the auger set down on the hole location. The power take-off is engaged to drive the auger while its downward motion is controlled by the winch line. A crewman in the cab operates the auger drive and winch line and the ground man directs the auger's drilling angle with the hand guide. When the auger is loaded with dirt, it is stopped and removed from the hole. The dirt is thrown off by spinning the auger above the ground.

While setting the pole, the digger unit is laid on the ground leaving the winch line free for the pole setting operation. To move to the next pole site, the digger is picked up in the normal manner and the truck driven to the next location.

Of interest to all construction men, also, is a special fold-over derrick storage kit that has been developed and extensively used over the past one and one-half years. These kits consist of a group of parts that can be added to trucks, either front or rear, to store the derrick on top of the truck through the use of the winch line. This operation is accomplished in less than 30 seconds. The derrick may also be raised into the working position in about the same time. The most recent development along this line is an arrangement to store the digger and auger, along with the derrick on top of the truck. This arrangement permits the two-man crew to complete its work more easily and in less time than by the old conventional methods formerly used. (See *Fig. 26.)*

# THE OPERATOR'S CORNER

*Concluded from page 29*

(3) Which operators are classified as "International Operators"?

(4) When an operator receives a request from a customer to place a call to an international point, how should the operator proceed?

(5) How should the outward operator proceed in reaching the circuit terminal office and international operator?

*Answers are presented on page 51.*

## General Pence New Chief of Signal Plans and Operations

Brig. Gen. William P. Pence, formerly special assistant to the Chief Signal Officer, has assumed his new duties as Chief of the Signal Plans and Operations Division in the Office of the Chief Signal Officer.

Prior to reporting for duty in the Office of the Chief Signal Officer in June 1955, General Pence had served for three years as Signal Officer of the 7th U. S. Army in Europe.

General Pence's first tour of duty in Washington occurred in 1934 when he became Chief of the Telephone Section in the Plant and Traffic Division in the Office of the Chief Signal Officer. In 1941, he rejoined the staff of the Chief Signal Officer as Chief of the Publications and Training Section. From January 1942 to November 1944, General Pence was assigned to the War Department General Staff in Washington, D. C.

General Pence graduated from Western High School in Washington in 1923 and from the United States Military Academy in 1927. He completed the one-year course in Signal Communications at Sheffield Scientific School, Yale University, in 1927 and concluded the Company Officers' course of instruction at The Signal School, Fort Monmouth, N. J., in June 1929.

As Chief of the Signal Plans and Operations Division, General Pence relieves Colonel William M. Thames who has been designated Assistant Chief of the Division.

## French OK Modernization Of Telecommunications

The French Minister of Posts, Telegraphs and Telephones has been authorized to make contractual obligations for modernization of telecommunications in France to the extent of 100 billion francs, or 285.7 million dollars, over a four-year period, it was reported on Oct. 3.

The program includes the expansion and modernization of telephone exchanges, connection of toll networks, trunklines, radio-telegraphy circuits for overseas traffic, and tele-printer operations.

### Answers to Questions On Page 29

(1) Quote the rate in effect at the time the request is received unless a different rate is requested, saying "(Amount for initial period)."

(2) International calls are calls from the United States and Canada to other countries including Newfoundland and territories of the United States, and vice versa. They do not include calls to and from points in Mexico located near the United States border and tributary to United States toll centers, and calls between points in the United States and Canada.

(3) Operators at circuit-terminal offices who handle international calls.

(4) The operator should say, "I will give you the international operator, will you hold the line, please." Then establish connection with the international operator at the proper circuit-terminal office. She will record and handle all details of the call. If the call is received over a manual recording trunk, secure the customer's number if it is not volunteered.

(5) Proceed in the regular way for an outward call, except that you use the toll cord of the idle pair farthest from the calculagraph. Also prefix "International" to your order to each intermediate operator and otherwise give the call its proper class precedence.


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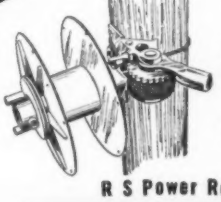
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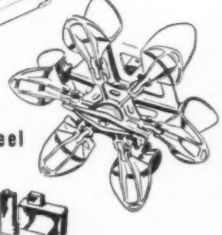
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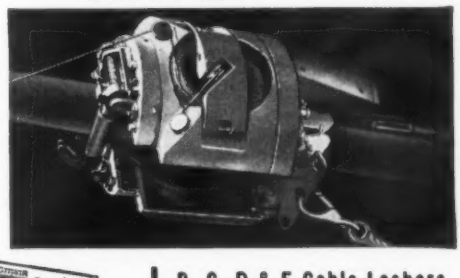

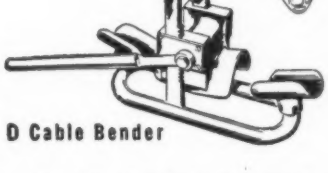
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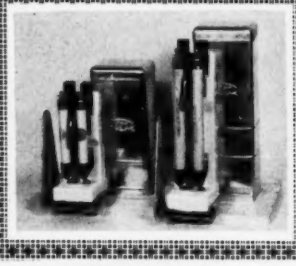

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## L. K. Powley Becomes Member Whitney Blake Sales Staff

L. K. Powley has joined the Whitney Blake Co. sales staff, to represent the company in western Pennsylvania and northern Ohio.

Mr. Powley was educated in England at Wimbledon Technical College and at Croydon College. After working for a time in the British Post Office Engineering Department (in England the Post Office operates all telephones) he entered the British army in June, 1939, as a signalman.

L. K. POWLEY

After his discharge in April, 1946, with the rank of captain, he joined the Jamaica Telephone Co., Kingston, Jamaica, British West Indies, as superintendent of outside plant construction and maintenance.

In December, 1952, he became superintendent of outside plant construction and maintenance for Elyria (O.) Telephone Co., where he remained until August, 1955.

Mr. Powley will make his headquarters in Cleveland, O.

## General Cable Will Build Plant in Tampa, Fla.

General Cable Corp. will construct a modern manufacturing plant in Tampa, Fla., where it already operates a warehouse and sales office, it was announced Sept. 13 by I. T. Bennett, chairman of the Board, and J. R. MacDonald, president of General Cable.

Approximately 9 acres are being purchased from the Seaboard Railroad Co. The initial unit will have approximately 50,000 square feet and will be equipped with completely modern equipment for the manufacture of paper telephone cable and other wires and cables for the constantly growing requirements of telephone companies operating in the Southeast.

"The tremendous industrial development and ever-expanding markets of Florida have convinced us that we should be the first manufacturer of electrical wire and cable to locate a manufacturing plant in Florida," Mr. MacDonald said. "Although the initial unit will be equipped primarily for the manufacture of telephone wires and cables, we are purchasing sufficient land to enable us to construct additional units for the manufacture of wires and cables for the utility, industrial and building markets. Our expansion in Florida will, of course, be determined by the demand for our products, but we have every reason to believe that the growth of Florida and the Southeast will continue to be such that we will shortly be adding substantially to our manufacturing facilities in Tampa and our distribution facilities in other parts of Florida."

Construction of the new General Cable plant will begin in October and it is expected to be in operation by March, 1956. It will be a modern one-story building with a brick front and an air-conditioned office. Approximately 125 people will be employed at the start and with the exception of a few technical employes, all of them will be recruited locally.

Upon completion of the Tampa plant, General Cable will be operating nine plants in the United States. The other plants are located at Bayonne and Perth Amboy, N. J.; Emeryville and Los Angeles, Cal.; Monticello, Ill.; Providence, R. I.; Rome, N. Y., and St. Louis, Mo. It is also constructing a plant in Winnipeg, Canada, in association with Canadian and British interests.

## Stromberg-Carlson Closes Dallas Telephone Branch

Stromberg-Carlson Co., a division of General Dynamics Corp., has announced the closing of its Dallas, Tex., telephone branch.

Architect's drawing of General Cable Corp.'s new plant to be built in Tampa, Fla.

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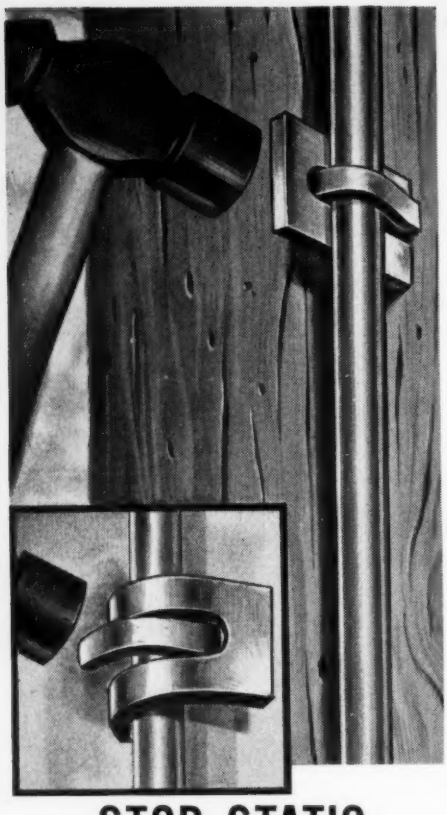

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The company also stated that its telephone division, Rochester 3, N. Y., will handle all inquiries on carrier and microwave radio equipment.

## Piedmont Names Chairman

The board of directors of the Piedmont Wood Preserving Co., Spartanburg, S. C., have announced the election of W. Priestly Conyers Jr. as chairman of the board and William J. Maroney, president.

### STATEMENT OF OWNERSHIP

Statement required by the Act of Congress of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233), showing the ownership, management and circulation of TELEPHONY, published weekly at Chicago, Ill., for October 1, 1954.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Telephony Publishing Corp., 608 S. Dearborn St., Chicago 5, Ill.; editor, Ralph C. Reno, 608 S. Dearborn St., Chicago 5, Ill.; managing editor, Dan S. Fargo, 608 S. Dearborn St., Chicago 5, Ill., and business manager, H. D. Fargo, Jr., 608 S. Dearborn St., Chicago 5, Ill.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as those of each individual member, must be given.)

Telephony Publishing Corp., 608 S. Dearborn St., Chicago 5, Ill.: H. D. Fargo, 608 S. Dearborn St., Chicago 5, Ill.; H. D. Fargo, Jr., 608 S. Dearborn St., Chicago 5, Ill.; Ralph C. Reno, 608 S. Dearborn St., Chicago 5, Ill.; A. J. Stults, 608 S. Dearborn St., Chicago 5, Ill., and Dan S. Fargo, 608 S. Dearborn St., Chicago 5, Ill.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: 9,903.

RALPH C. RENO.

Sworn to and subscribed before me this 26th day of September, 1954.

M. TERI SMITH.

(My commission expires December 10, 1958.)

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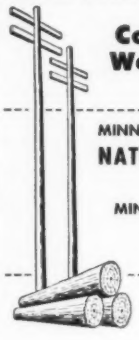

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